

LONGWALL PERMIT

D-0360-1

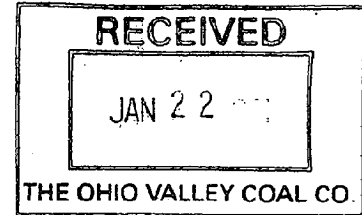
Original: Vault @ Alledonia
 File: TOVCC
 Permits-Mining-Longwell
 Coal & oil



January 18, 1991 Fountain Square
 Columbus, Ohio 43224

Mr. Robert Murray
 Ohio Valley Coal Company
 56854 Pleasant Ridge Road
 Alledonia, Ohio 43902

cc: Maynard St. John
 John Gervelli
 David Bartel
 Dick Rie
 Bob Matthews



30 days
 feb 21

Dear Mr. Murray:

This is to inform you that the Ohio Valley Coal Company Adjacent Area Coal Mining Permit Application #D-0360-1 has been approved. The Division has performed a thorough review of the application, taking into consideration the concerns raised at the informal conference held on November 8, 1990, and has found that the revised application meets all the requirements of Chapter 1513. of the Ohio Revised Code.

Enclosed is a copy of the written findings resulting from concerns raised at the informal conference. These written findings address the general and specific comments made relative to application #D-0360-1.

If you are a person having an interest that is or may be adversely affected by the Chief's decision of approval, and if you want to appeal the Chief's decision, you may do so by filing a notice of appeal with the Reclamation Board of Review, Ohio Department of Natural Resources, 1855 Fountain Square Court, Suite 124, Columbus, Ohio 43224, (614) 262-1269 within thirty days after the applicant is notified of this decision. Also, it would be necessary to file a copy of this notice of appeal with the Chief of the Division of Reclamation, Ohio Department of Natural Resources, 1855 Fountain Square Court, Columbus, Ohio 43224, within three days after filing the notice of appeal with the Board. Further essential provisions governing appeals to the Board, including request for temporary relief, are found in Section 1513.07 (I)(3) and 1513.13 of the Ohio Revised Code.

If you require further information regarding the approval of this application, please contact Harry Payne, Athens District office, at (614) 594-3507.

Sincerely,

Tim L. Dieringer
 Chief
 Division of Reclamation

TLD:KR:sm
 cc: St. Clairsville Dist. office
 Certified Receipt #P829 635316

George V. Voinovich, Governor

TOVCC 15043

JAN 18 1991

WRITTEN FINDINGS - INFORMAL CONFERENCE - NOVEMBER 8, 1990
Ohio Valley Coal Company
Adjacent Area Coal Mining Permit Application #D-0360-1

1. Concern: There are times when county water is not available in sufficient quantity, for example, the drought of '88 which caused shortages and the June 14, 1990 flood which broke water lines along Weege Creek. If county water is the only source left to farmers at such times, it will be insufficient to meet daily farm operational needs.

Response:

No water supplies, regardless of whether they have been developed by the landowner or provided by a public service, are guaranteed to provide continuous service during times of natural disasters. If the public water system is being used as an interim supply and the interim supply is interrupted, then it is the responsibility of the coal company, within 48 hours, to take the necessary measures to repair or replace the interim supply. This may include hauling water into affected properties. Ohio Valley Coal Co. (OVCC) has stated in the Alternative Water Supply Information, Addendum to page 29, Part 2, F(2) of the Adjacent Area Application, that in the past, OVCC has always attempted to consult and negotiate with the affected property owner concerning the selection of the type of water replacement. This is done at the request of the property owners who prefer this procedure to that of OVCC making unilateral decisions about replacement supplies and sites. When selecting a permanent alternative water supply the property owner will have an option, when feasible. Public water is not anticipated to be the only replacement source.

2. Concern: OVCC states in the application they reserve the right to proceed against the landowner to recover costs incurred for laying public water lines or paying water bills if it is determined that OVCC is not liable for the contamination, diminution or interruption of the affected water supply. The permit application should leave no doubt as to who is going to pay for water replacement.

Response:

In the event that a water supply is diminished by coal mining activities, the coal company will bear the cost of providing an alternative interim and permanent supply.

However, there are factors other than longwall mining which may diminish ground water supplies. The mechanism which may be employed by the coal company in the event the company determines that the coal mining operations did not result in the loss of the supply is defined in the water replacement plan. This clause is included by OVCC to protect themselves against claims of water loss for which they are not liable. In any event, the Division of Reclamation (DOR) will monitor water replacement plans and make the final determination of causal relationships with respect to resolution of complaints. Decisions of this nature are appealable under Chapter 1513. of the Ohio Revised Code (ORC).

3. Concern:

Longwall mining dewateres the land leaving dry springs and wells. The permit application does not address what will be done to deal with these now worthless pits and loss of spring and stream flow.

Response:

As long as monitoring is required on certain portions of a permit, the wells and springs that are being monitored are required to remain accessible until such time as monitoring is determined to be completed, as designated by DOR. When monitoring is no longer necessary, exploratory or monitoring wells shall be sealed in a safe and environmentally sound manner, in accordance with Ohio Administrative Code (OAC) rule 1501:13-9-02. With prior approval of the chief, pursuant to rule 1501:13-9-04, wells may be transferred to another party for further use. Also refer to the enclosed Cumulative Hydrologic Impact Assessment (CHIA).

4. Concern:

Decisions relative to the alternative water source to be developed should be left up to the landowners' as to whether they want to be hooked up to the public water system or have redrilled wells and redeveloped springs. The landowners are told by the industry and state that water will be there in better quantity and quality after longwalling, just deeper. Why aren't wells being drilled for long term replacement? Why should landowners be saddled with water bills and a heavier burden placed on the county water system?

Response:

Refer to the response to Concern #1.

5. Concern:

In the application under water replacement, it discusses OVCC paying for replacement of the water, however, if there

hasn't been an agreement signed with OVCC by the landowner, who pays not only for replacement but for long term costs of water bills? DOR has stated that this is a "gray area"; there should be no "gray areas" in the approved application.

Response:

OVCC is required to pay for water replacement, both interim and permanent, if the supply has been adversely impacted by the mining operation. DOR does not regulate agreements between the landowner and the coal company. ORC Chapter 1513. does not address payment for the cost of public water bills for permanent replacement options.

6. Concern:

DOR has experienced staffing problems in the Technical section, and thus doesn't have enough staff to determine if, in fact, water loss was caused by the longwall operations conducted on the previous permit. How can DOR consider issuing another permit when it's DOR's responsibility to enforce and have some idea how to handle the resulting problems.

Response:

DOR has recently filled the Natural Resource Administrator I position in the Technical Section. During the time period that the position was vacant, complaints regarding ground water contamination or diminution were handled on a priority basis by qualified personnel within other sections of the Division.

7. Concern:

When will water losses be replaced? The application addresses this inconsistently in the water replacement plan and alternative water supply information sections.

Response:

ORC Section 1513.162 states that the coal mining operator shall reimburse the owner for the reasonable cost of obtaining a water supply from the time of the contamination, diminution, or interruption by the operation until the water supply is replaced. The water replacement plan states that landowner will notify OVCC by calling a telephone number provided within the application. The water replacement plan does not appear to be inconsistent since it is stated, in at least two locations of the plan, that OVCC will undertake/begin within 48 hours of learning of the diminution or contamination to provide a temporary water supply for the landowner. OVCC will make a determination of liability no later than 60 days after notification of the contamination, diminution, or interruption of a water supply. During the 60 day time

period OVCC will continue to provide water for the landowner as required by ORC Section 1513.162. If OVCC determines that the contamination, diminution, or interruption of a water supply was not caused by the mining operation, then OVCC will provide DOR with notice of its determination and the proof in support of that determination. In response to any water supply complaint, DOR will investigate and make a determination as to the cause of the contamination, diminution, or interruption. Such decisions made by the Chief of DOR as a result of DOR investigations are appealable under ORC Chapter 1513. Until the avenues of appeal are exhausted, it is the coal company's responsibility to maintain a water supply for the affected landowner. The permanent supply will be restored no later than 18 months after it has been determined that the supply has been contaminated, diminished, or interrupted as a proximate result of the mining operation.

8. Concern:

Who proves the cause of the water loss? Who determines what is the cause of the water loss? The application, by not stating just who must prove or disprove the cause of water loss, violates the law established in the Citizens Organized Against Longwalling v. Division of Reclamation (1987) case.

Response:

In the event the coal company does not feel they are responsible for the loss of landowner's water supply, information regarding the coal company's determination will be provided to DOR as stated within the water replacement plan of the application. The DOR will review the information submitted by the coal company as well as the data on file with DOR, and investigate the situation to determine if a Chief's Order is necessary to require the coal company to replace the water supply. It is the DOR's responsibility to determine whether the mining operation is the cause of the water loss. DOR considers OVCC's water replacement plan to be consistent with the 1987 decision mentioned and the 1989 decision of the Meigs County Court of Appeals in Coal v. Southern Ohio Coal Company (Case No. 410.)

9. Concern:

Will OVCC replace all water losses? The application contradicts itself between the alternative water supply information and hydrologic determination sections. Landowners need to know if all water or only the amount used prior to mining will be replaced. The law requires replacement of water supplies. The coal company must replace the supplies, not merely the portions of supplies utilized prior to mining.

Response:

The law and rules both state that an operator "shall replace the water supply of an owner of interest in real property who obtains all or part of his supply of water for domestic, agricultural, industrial, or other legitimate use from an underground or surface source where the supply has been affected by contamination, diminution, or interruption proximately resulting from the coal mining operation and shall reimburse the owner for the reasonable cost of obtaining a water supply from the time of the contamination, diminution, or interruption by the operation until the water supply is replaced." OVCC is responsible for replacing legitimately used supplies which have been affected by contamination, diminution or interruption proximately resulting from the mining operation, in accordance with ORC 1513.162.

10.

Concern:

Are there any wetlands to be undermined? Is the coal company allowed to drain wetlands? Doesn't federal law prohibit draining wetlands?

Response:

The Ohio EPA, ODNR - Division of Natural Areas and Preserves (DNAP) and the U.S. Army Corps of Engineers were notified by DOR of receipt of this application and requested to comment with respect to their scope of responsibilities, which include assessment of wetland areas. DOR did not receive any comments and/or responses relative to wetlands, nor were any wetlands identified during DOR's review of the proposed area. DOR did receive a response from DNAP indicating the proposed mining project was not judged as having significant impacts on known locations of state/federal listed plants or animals, state nature preserves, wild/scenic/recreational rivers or public recreational areas managed by ODNR.

11.

Concern:

Subsidence cracks and landslides cause safety hazards to recreational users and farmers who have to work the fields daily with tractors, haybines, bailers, cornpickers and other farm machinery.

Response:

OVCC's subsidence control plan states: "Prior to the introduction of farm equipment into fields that have been undermined, OVCC will inspect the field for cracks or slips. Repairs needed (to maintain access into the fields) will be made at appropriate times. Croplands damaged by subsidence will be repaired at appropriate times to permit harvest or cultivation without damage to personnel or

equipment. Areas being mined will be inspected at various intervals, ranging from daily to weekly. These areas will be visually inspected for any subsidence related problems. If a problem is found, the landowner will be notified immediately. If surface cracks are (found) in an area that is commonly traveled by man or livestock, the cracks will be repaired immediately."

These responses, which are identical to those in the previously approved longwall permit R-0360-2, thoroughly and adequately address this concern. Finally, OVCC is obligated to restore the land surface to a condition capable of maintaining the value and foreseeable use(s) that the land was capable of supporting prior to subsidence, in accordance with current Ohio law.

12. **Concern:**

The plan to repair a large landslide on the Liddle property was submitted by OVCC and approved by the DOR without a full inspection by the local inspector. The landowner had no input into this plan and has concerns relative to how and when repairs will take place, storage areas for equipment, etc., which haven't been addressed. The DOR has indicated OAC rule 1501:13-12-03 is silent in regard to landowner input in the development of repair plans, however, property owners have some basic rights, such as having input as to how their land will be repaired and when.

Response:

The local reclamation inspector did conduct a full inspection of the landslide on the Liddle property on the same day OVCC notified DOR that the slip occurred. DOR has the authority to decide if a repair plan submitted pursuant to OAC rule 1501:13-12-03 adequately assures the restoration of the land surface to a condition capable of maintaining the value and reasonably foreseeable uses which it was capable of supporting before subsidence. DOR will make every effort to keep landowners informed of plans submitted concerning their property. Landowners do have control of the timing of implementation of such plans since they control access to their property.

13. **Concern:**

Why wasn't a notice of violation issued to OVCC for damages to the Liddle property?

Response:

Pursuant to OAC 1501:13-12-03, material damage notices to underground operators shall be by letter or inspection report, and ".... shall not be deemed a notice of violation." Pursuant to Division Policy/Procedure

Directive, Underground 90-2, "Subsidence Damage," a subsidence damage notice will be issued unless the operator has already notified the DOR of such damage. In the case of the Liddle property, a subsidence damage notice was issued to OVCC for the damaged structures. A subsidence damage notice was not issued concerning the landslide as OVCC notified DOR of such damage. Although a damage notice was not issued, DOR reviews, approves, and monitors implementation of the submitted repair plan for the landslide.

14. **Concern:**

OVCC was issued a notice of violation for being beyond the boundaries on the first longwall permit. The mine was stopped one day, the permit revised, and the violation was lifted. Why wasn't the public told of this? If the permit was revised to cover up violations, why even have a permit?

Response:

The notice of violation was issued on March 29, 1990 for mining outside of the full coal recovery area limits. The operator was required to cease mining beyond the approved limits and submit a permit revision to be approved prior to additional mining inconsistent with the approved plan. The permit revision was deemed insignificant (and therefore not subject to public review) as the area was small (approximately 100 feet wide), was within the projected subsidence zone, and did not involve any additional landowners. The permit was not revised to cover up a violation, but was revised to abate a violation.

15. **Concern:**

Damages to the Liddle property were more severe than anyone was led to believe could happen and not yet repaired. The new permit area application should not be issued until existing property damages are repaired. If damages can't be repaired, no new permits should be issued.

Response:

Damages to the Liddle property were within the range of those anticipated in the subsidence control plan. A permit application cannot be blocked unless an applicant is currently failing to abate a notice of violation to the satisfaction of DOR. In this case, with respect to subsidence damages, OVCC has complied with all provisions of the OAC requiring submission of plans to repair such damages. The approved repair plans are not being implemented due to the Liddle's denial of access to their property.

16. Concern:
OVCC doesn't want landowners to have counsel present when negotiating agreements for repair and water replacement and the landowner can't tell anyone what is in the agreement. If no agreement is signed, there'll be no settlement and the owner pays for his own water. This takes away a person's freedom of speech and rights as a landowner. OVCC's "good neighbor policy" is inadequate.

Response:

The absence of an agreement does not leave the landowner without remedy. The ORC and OAC require the restoration of the value and foreseeable use of the land, repair or compensation for diminished value whenever structures are damaged by subsidence, as well as interim water and a permanent replacement at the expense of the operator of all impacted developed water supplies. While DOR understands that landowners usually benefit from subsidence agreements to a greater extent than the ORC provides, such agreements are by no means mandatory.

17. Concern:
Landowners and families affected by longwall subsidence suffer mental strain and stress.

Response:

ORC Chapter 1513. does not address the mental health effects of mining. DOR has no authority to address this concern.

18. Concern:
The permit explains how damages to the surface will be repaired. Have any repairs been done on damaged lands in this area? Where will OVCC find a contractor who knows how to repair these damages resulting from subsidence?

Response:

All of the damages that have occurred at longwall operations in Ohio have been repaired in a similar manner utilizing standard construction techniques. OVCC should have no difficulty finding a contractor to repair subsidence damages.

19. Concern:
Remedial action has been focused on short term issues, such as compensation, repair and damages to structures; the focus should be shifted away from fixing and onto preventing (damages).

Response:

Full coal recovery operations are exempt from the requirement to prevent subsidence related damage. OAC rule

1501:13-4-14 (M) addresses the application requirements for subsidence control plans. The rule requires that, once an applicant demonstrates the mine method proposed will result in planned subsidence in a predictable and controlled manner, the application contain a description of the anticipated effects and a general description of the measures to mitigate or remedy subsidence-related damages, pursuant to paragraphs (M)(2)(e) and (f). Thus, the applicant is not required to include a description of measures to be used to minimize or prevent subsidence in areas where planned subsidence is proposed.

20. **Concern:**

What's the more valuable resource in this area, ground water or high sulfur coal? The application should include a complete environmental impact study addressing the issues of economics, loss of other resources such as ground water and productivity, and stress on the affected people.

Response:

DOR does not have jurisdiction under ORC Chapter 1513. to determine the value of various resources.

Regarding the suggestion that a full environmental impact assessment is necessary to properly evaluate this application, the ORC does not provide for such an extensive assessment as part of the review process.

21. **Concern:**

In Europe, surface features determine how a mine is laid out; in Ohio, the panels are laid out for the convenience/profitability of the coal company with no consideration of surface features or people thereon. The coal company should be required to recover their coal in a responsible way, using all known technology including options such as backfilling, to minimize subsidence.

Response:

Except for the provisions contained in OAC 1501:13-12-03 (J), ORC Chapter 1513. does not authorize DOR to require full coal recovery operations to plan their longwall panels so as to avoid specific structures and surface features. Also refer to the response to Concern #19.

22. **Concern:**

DOR should assure the financial ability of the applicant to perform required repairs and provide restitution for damages by requiring a performance bond of 100% of the pre-mining property value to be maintained for four (4) years following completion of mining operations in the area.

Response:

ORC Chapter 1513. does not authorize DOR to require a performance bond for property overlying underground coal removal areas. The Division has no authority to address this concern.

23. **Concern:**

Four (4) seams of coal above the longwall area will be damaged by subsidence. Information from Ohio State University library as to how much coal is located above the #8 seam and assessment at modest tippable prices shows as much as \$600,000 to \$1 million worth of coal sacrificed for each acre of #8 coal longwallled. This is a terrible loss in resources and future mining jobs to trade for this longwall mine.

Response:

ORC Chapter 1513. regulates surface impacts incident to underground coal mining and reclamation operations. Such surface impacts do not generally include alleged impacts on other coal seams. Based on a literature search of published research relative to multiple seam underground mining, full coal extraction on a lower seam does not appear to preclude the extraction of an upper seam by subsequent underground mining methodologies. Several of the papers reviewed recommended full coal extraction to facilitate multiple seam mining; the intent being to eliminate some of the difficulties evident when pillars are left in place. None of the research reviewed appeared to suggest that, in general, the upper seam of coal was no longer recoverable or marketable. When this data is applied to subsequent surface coal mining operations above full coal extraction areas, the conclusion appears to be that no serious degradation of the strippable reserve occurs.

24. **Concern:**

The severance deed for the property owned by Chalmer and Ida Campbell does not contain a waiver for damage clause. Without this waiver, OVCC only has the right to mine in a manner that will not cause damage beyond that anticipated by methods of mining which were in existence when the severance deed was signed. The application fails to demonstrate OVCC has the clear right to mine by the longwall method.

Response:

The application documents submitted demonstrate proof of ownership or leasehold interest in the coal to be mined and fulfill current regulatory requirements of ORC Section 1513.07 (B)(2)(i) and OAC 1501:13-4-03 (A)(3). An issue of

disputed subjacent support rights is not within the scope of the Division's authority to resolve; ORC Chapter 1513. specifically states "... this chapter does not authorize the chief to adjudicate property rights disputes."

25. **Concern:**

How long will mining last? The application is for a two year period, 1990-1992; the company, however, indicates mining will stretch over a ten-year period elsewhere in the annual/total production tonnages and engineering and mining techniques sections.

Response:

The projected mining period for area proposed in application #D-0360-1 is two years. Future mining of the remaining reserves over the next ten years, however, is anticipated as indicated in application responses and the future permit sequencing map. It should be noted this information regarding mining of reserves is only a projection of future mining. The permittee will be required to submit additional applications to permit and mine any additional areas.

26. **Concern:**

The application fails to meet buffer zone and prohibited area requirements of federal law, pursuant to Section 522 (e) of SMCRA.

Response:

DOR interprets the ORC Chapter 1513. counterpart to the federal 522 (e) prohibitions as applicable only to surface mining operations.

27. **Concern:**

The application fails to meet the subsidence prevention requirements of federal law, pursuant to Section 516 (b) of SMCRA.

Response:

Section 516(b) of SMCRA, and the corresponding ORC Chapter 1513. counterpart do not contain any subsidence prevention requirements for planned subsidence mining technology. The OVCC application #D-0360-1 proposes to utilize longwall mining, a mining technology which requires planned subsidence in a predictable and controlled manner. Therefore, it is exempt from any subsidence prevention requirements contained in Section 516 (b).

28. **Concern:**

Fissures or cracks caused by longwall mining subsidence and emissions from coal mine exhaust fans could release radon gas to the surface, exposing residents to this radioactive

health hazard. Dr. Lynn Chyi, geologist at the University of Akron, published a paper on emissions from abandoned deep mines found in northeast Ohio in the fall of 1989, finding radon levels to be at least two times higher than normal above the mined out areas. In March, 1990, Dr. Chyi placed radon sensors in locations in Smith Township, Belmont County, which also detected very excessive radon levels above longwall mined areas compared to normal levels above non-mined areas. Radon emissions are detrimental to health; issuing a permit without due investigation and responsible evaluation of the possible effects of longwall mining on radon emission and proper reporting (monitoring) could place residents in danger and the state in a position of liability.

Response:

DOR has contacted Dr. Chyi, discussed his research, and reviewed the collected data which consists of post-mining data only. The absence of pre-mining data to which post-mining data must be compared precludes a definitive conclusion to this concern and, as noted by the University of Akron, the research data collected thus far is "completely experimental in nature" and "not for end use in industry or otherwise." DOR will maintain contact with Dr. Chyi as well as other research sources, and will request conclusive research studies be provided to DOR if and when they become available.

29. **Concern:**

Methane gas released from coal seams (#9, #10, #11, #12) located above and fractured by longwalling the #8 seam to be mined will result in hazardous conditions for residents in longwall mining areas.

Response:

The release of methane gas from naturally occurring coal seams has not been noted as a problem resulting in hazardous conditions for residents in coal bearing regions. DOR is not aware of any scientific study which would tend to support the concern that methane gas would be released from fractured coal seams in greater quantity above subsidence areas than that naturally occurring in unmined coal bearing regions.

30. **Concern:**

ODNR saw fit to place a buffer zone around Dysart Woods, thus, showing a willingness to protect a group of trees; however, ODNR is seemingly less willing to protect homes and farms.

Response:

The "buffer zone" referenced was established by Ohio University, not ODNR/DOR. Negotiations are currently pending to establish a monitoring program near Dysart Woods to investigate and establish the size of the buffer zone necessary to protect the virgin/mature forest ecosystem. ODNR is not electing to protect one resource to a higher degree than another, but is protecting all renewable resources and property to the extent provided for by the ORC.

31. **Concern:**

The proposed mining operations may negatively impact Dysart Woods, a National Natural Landmark site. Cracks in the surface or alteration of geohydrology due to subsidence in or adjacent to Dysart Woods have a high potential for negatively impacting the significant natural resources of this landmark.

Response:

The mining area approved in application #D-0360-1 is located approximately 0.43 miles southeast of Dysart Woods. Thus, the Woods are not adjacent to or within the approved mining area, angle of draw for full coal recovery area, hydrologic, or cultural, historical and archeological resource study area. DOR shares the concern for potential negative impacts due to mine subsidence on the woods; please refer to the response to Concern #30 for further information. DOR will continue to pursue funding to develop and implement studies framed to obtain a better understanding of the ecological and hydrological effects of underground mining.

32. **Concern:**

Real estate value is declining as fast as the longwall mine is removing coal and people are moving away. The temporary jobs created in the coal mine seem so minimal compared to the long term farm income in this area.

Response:

ORC Chapter 1513. does not address the question of market based property values, local tax base/revenue, community development, or local employment. DOR has no authority to address these concerns.

33. **Concern:**

Timber resources are being destroyed in the longwall mining areas.

Response:

DOR has not been presented with any evidence of long-term damage to timber lands from the timber industry or other source which documents an impeded use of the land for silviculture purposes as a result of longwall or full coal extraction operations. Pursuant to OAC rule 1501:13-12-03, should damage occur to the land surface due to subsidence, it must be restored to a condition capable of maintaining the value and reasonable foreseeable use(s) which it was capable of supporting before subsidence.

JAN 13 1991

**Ohio Valley Coal Company #D-0360-1
Cumulative Hydrologic Impact Assessment (CHIA)**

Application D-0360-1 is located within sections 19, 20, 25, and 26 of Smith Township, Belmont County. Surface waters overlying the proposed mining area are Millers Run, Anderson Run and their tributaries. The application and adjacent areas are located within the Captina Creek drainage basin. The 691 acre application area proposes to mine the Pittsburgh number 8 coal seam by the longwall mining method. Approximately 0.6% of the 115,712 acre Captina Creek drainage basin is proposed to be undermined by this application.

The original permit, D-0360, was issued in June of 1984 and consisted of 350.0 acres. Since the issuance of D-0360 three revisions to the permit have been approved for the purpose of mining coal. Application to Revise a Permit (A.R.P.) R-0360-1 was approved to mine by the room and pillar method of mining 4,159 coal acres. A.R.P. R-0360-2 was approved to mine by the room and pillar method of mining 470 coal acres. A.R.P. R-0360-5 was approved to mine by the room and pillar method of mining 679 coal acres. Application D-0360-1 proposes to mine 691 acres by the longwall method of mining. The total acreage which has been permitted under the surface effects of underground mining and the coal removal areas, including both room and pillar and longwall methods, consist of approximately 6,349 acres. Approximately 5.5% of the Captina Creek drainage basin has been authorized under D-0360.

The Pittsburgh coal seam has an elevation of between 700 and 720 feet m.s.l. (mean seal level) within the application and adjacent areas. The coal seam is reported to have a strike of N 27° E and a dip of S 63° E at a rate of 19 feet per mile. The topographic relief of the application area ranges from approximately 1320 feet m.s.l. on the ridge tops to 970 feet m.s.l. in the stream valleys. Developed ground water supplies have reported surface elevations ranging from 1164 to 1299. Reported well depths range from 26 to 90 feet averaging approximately 60 feet in depth. Those wells in which the depths are known have reported bottom elevations ranging from 1189 feet m.s.l. to 1246 feet m.s.l. Developed springs range in elevation from 1164 feet to 1267 feet m.s.l. The Pittsburgh coal seam is located approximately 450 feet below the lowest saturated zone identified within the hydrologic boundary of the application area.

Basically, the sedimentary cycle in Belmont County includes coal, clay and shale, sandstone, siltstone and mudstone, limestone and underclay. Ground water supplies within the hydrologic boundary of the application area are all developed on the ridge tops above the Washington #12 coal seam. The neritic and deltaic depositional environments during the Pennsylvanian and Permian systems resulted in considerable vertical and lateral shifts and facies changes, which resulted in the non-continuous

nature of the water bearing formations. The rocks in Belmont County form a gentle monocline that dips to the southeast at an average rate of 18 feet per mile. Locally, the dip increases to as much as 70 feet per mile where small flexures cause slight variations in the southeastward dip. Two small dome-shaped anticlines lie in the eastern part of the county, one in eastern Richland Township at Clarmount and the other in northernmost Mead and eastern Smith Townships. A narrow northeastward trending syncline, whose position was plotted from mine maps of the Pittsburgh coal bed, extends from west-central Pultney Township to the northeastern part of Pease Township. The width of the syncline ranges from a few hundred feet to about 1,100 feet. Locally, the syncline is cut by a normal fault along its western side, adjacent to the deepest part of the trough. Within the application area a graben fault has been identified extending into Smith Township, Belmont County. The seam is displaced approximately five feet. The faulted zone averages approximately 90 feet.

The fault displacement appears to decrease in the western portions of the application area and increases considerably within the eastern portions of the application.

Five test borings were drilled within the application area. The test borings consisted primarily of sandstone, limestone, clay, shales, siltstones, and coal. The percentage of sandstone and limestone (hard rock) within the overburden ranged from approximately 14% to 50% averaging approximately 27%. An average of 70% of the overburden is soft rock, shales and clays.

The geologic formations which yield underground water in the Captina Creek basin comprise two general classes: (1) consolidated layers of sandstones, shale, coal and limestone, and (2) the unconsolidated deposits of sand, gravel and clay. Less than 5% of the area encompassed by the Captina Creek basin is suitable for the development of large industrial or municipal underground water supplies. The larger industrial or municipal supplies are generally developed within the unconsolidated deposits adjacent to the Ohio River. The potential yield of wells developed beyond the influence of recharge from the Ohio River is 25-100 gallons per minute (g.p.m.). Although the unconsolidated deposits encountered in these wells are similar to the materials adjacent to the Ohio River, the location, with respect to recharge, proximity to the bedrock valley wall, and regional extent above drainage, limits the potential of these wells. More than 90% of the area is underlain with bedrock formations considered to yield little or no ground water. Yields of less than 2 g.p.m. are developed in various layers of sandstone, shale, limestone and coal. The variation in the physical characteristics of the bedrock and the topography govern the yield of wells developed in this area. The best bedrock wells are developed in the valleys adjacent to the streams. The rapid runoff of precipitation from the rugged hillsides deter the seepage of recharge to the more permeable bedrock formations.

The application area is developed within a portion of the Captina Creek drainage basin in which wells seldom yield as much as 5 g.p.m. Ground water supplies are developed within undifferentiated layers of siltstone interbedded with shale, clay, and limestone. Yields average less than 2 g.p.m. However, wells drilled or dug within the flood plain of Captina Creek may yield as much as 25 g.p.m. A salt/fresh water interface occurs approximately 200 feet below the valley floors within the general vicinity of the application area. Any water derived from an elevation 200 feet below the valley floor may contain over 10,000 parts per million of total dissolved solids and render ground water at this elevation unpotable.

The applicant identified six saturated zones within the application and adjacent areas which are developed for use for either agricultural or domestic purposes. The six saturated zones range from 1147 feet m.s.l. to 1272 feet m.s.l. All of the developed ground water supplies are reported to be developed in either shales or limey shales. Because the ground water supplies are reported to be developed within shales, it is deduced that these supplies are developed within perched and/or semi-perched water tables beneath the ridges.

It is not anticipated that the quality of water will be degraded as a result of the proposed operation. Water quality data, as a result of various monitoring plans on file with the Division of Reclamation as well as the review of literature pertaining to the impacts of longwall mining operations upon the hydrologic balance of the permit and adjacent areas, have not shown any significant impacts to the quality of ground water.

The first longwall permit for D-0360, A.R.P. R-0360-2, was approved in December of 1989. The coal seam is reported to lie approximately between the elevations of 710 and 720 feet m.s.l. within the vicinity of R-0360-2. Fifteen ground water supplies are reported to be located within the hydrologic boundary of the monitoring plan for R-0360-2 as of September 30, 1990. The supplies inventoried are W-13, W-19, W-21, W-31, W-32, W-35, W-36, W-37, W-38, W-39, W-41, W-42, SP-11, SP-20, and SP-22. Twelve of the ground water supplies are wells, three are springs. Wells W-31, W-39, W-41, and W-42 are reported to be inaccessible for measurements. Wells W-31, W-41, and W-42 are located over panels. Well W-39 is located over a gate. No data has been collected at these wells because of their inaccessibility. The monitoring data for the remaining wells is discussed in the following paragraphs.

Well W-21 has a surface elevation of 1225 feet m.s.l. and a bottom elevation of 1140 feet m.s.l. The coal seam is about 425 feet below the bottom elevation of the well. W-21 is located south of panel 5-West, on a gate. Mining took place within 500 feet of this supply. Mining took place within the vicinity of this supply in February 1990. W-21 was diminished as a result of

mining operations and appears to have recovered particularly. The s.w.l. (static water level) for this supply has recovered to within 7 feet of the pre-mining level. W-21 is outside of the angle of draw for panel 5-West.

Well W-35 has a surface elevation of 1210' m.s.l. and a bottom elevation of 1125' m.s.l. W-35 is located over panel 5-West. Water elevations were measured at 17 feet and 15 feet below land surface in October of 1989 and March of 1990. Mining took place under this supply in March of 1990. The coal seam is about 410' below the bottom elevation of the well. W-35 was diminished as a result of mining operations and has recovered partially. The well collapsed after being undermined from 85 feet in total depth to about a 72 foot total depth below the surface. In April 1990, the well began holding water above the 72 foot level. Currently the well is reported to be recovering with an average water level at about 55 feet below the surface elevation.

Well W-36 has a surface elevation of 1210' m.s.l. and a bottom elevation of 1183' m.s.l. The bottom elevation of W-36 is located approximately 468 feet above the coal seam. The pre-mining static water level below the ground surface was about 16 feet. W-36 is located over panel 5-West. Mining took place under this supply in March of 1990. This well was dewatered and as of 9/30/90 displayed an insignificant recovery.

Well W-37 has a surface elevation of 1255' m.s.l. and a bottom elevation of 1193' m.s.l. The bottom elevation of W-37 is located approximately 478' above the coal. W-37 is located off of panel 5-West within 500 feet of the panel and outside of the angle of draw. W-37 was unaffected by the mining operation.

Well W-19 is located on a gate between panels 5-West and 6-West. Panels 5-West and 6-West passed by W-19 in April and July of 1990 respectively. The depth of well W-19 is unknown. The well was covered with a hand pump making pre-mining water level readings impossible. The property containing W-19 was purchased by O.V.C.C. and the well was opened to provide access for measurements in April of 1990. No impact was observed to the well with the passing of both panels.

Well W-13 is located off of the 5-West panel, within 500 feet east of the panel. W-13 has a surface elevation of 1283' m.s.l. and a bottom elevation of 1218' m.s.l. The well is located outside of the angle of draw of the mining operation and was unaffected by longwall mining.

Well W-38 is located near the edge of the panel and the gate between panels 6-West and 7-West. W-38 has a surface elevation of 1270' m.s.l. and a bottom elevation of 1182' m.s.l. The bottom of W-38 is located about 467' above the coal seam. Mining took place within 200 feet of W-38 in August of 1990 with little or no effect on the well.

Well W-32 is located near the edge of the panel and the gate between panels 6-West and 7-West. W-32 has a surface elevation of 1265' m.s.l. and a bottom elevation of 1167' m.s.l. The bottom of W-38 is located about 452' above the coal seam. Mining took place within 200 feet of W-32 in August of 1990 with little or no affect on the well.

Spring SP-11 has a surface elevation of 1200' m.s.l., approximately 485' above the coal seam. SP-11 is located over panel 5-West and was undermined in April of 1990. SP-11 was diminished by the mining operation and has lost over 50% of its pre-mining flow.

Spring SP-20 is located over panel 6-West and was undermined in June of 1990. SP-20 has a surface elevation of 1148' m.s.l. and is approximately 485' above the coal. SP-20 was dewatered in July of 1990.

Spring SP-22 is located over panel 6-West and was undermined in August of 1990. The spring has a surface elevation of 1250' m.s.l. and is approximately 535' above the coal. SP-22 was diminished in flow by a factor of 10 after it was undermined.

The eleven ground water supplies monitored displayed the following impacts as a result of mining within R-0360-2. Wells W-35 and W-36 and springs SP-11, SP-20, and SP-22 were located over panels. Well W-36 was dewatered. Well W-35 was dewatered and has recovered partially. Spring SP-11 was diminished and has thus far displayed approximately 40% of the pre-mining flow. Spring SP-20 was completely dewatered as a result of mining operations. Spring SP-22 was diminished and has thus far displayed approximately 10% of the pre-mining flow.

Wells W-21, W-19, W-38, and W-32 are shown to be located over gates or near the very edges of the panels. Wells W-19, W-35, and W-32 are located between two panels. Well W-21 is located on a gate south of a panel. Wells W-19, W-32 and W-38 do not appear to have been impacted by the mining operations. Well W-21 was impacted by the mining operations. Well W-21 lost as much as 30 feet of head in the well but displayed recovery to within 7 feet of the pre-mining s.w.l.

Wells W-37 and W-13 are located off of both panels and gates and were unaffected by the mining operations. Both wells were located outside of the angle of draw.

Based upon the data on file with the application and monitoring data submitted for permit D-0360 it is anticipated that all ground water supplies, springs and wells located over panels will be impacted as a result of the proposed operations. It is anticipated, of those supplies located over the panels, 33% of the springs will be dewatered and 67% of the springs will be diminished. It is anticipated that 50% of the wells may be dewatered. W-35 is an 85 foot deep well but displayed partial

recovery after the well collapsed 72' below the surface. Well W-36 is 27 feet deep and dewatered as a result of mining operations.

Four ground water supplies were located over gates or near the edges of the panels. 75% of these wells displayed little to no impact as a result of mining. One well did display a loss of over 30 feet in head but regained a s.w.l. measurement within 7 feet of the pre-mining levels. 25% of those wells over gates or near the edges of the panels are anticipated to be slightly diminished.

It is not anticipated that any supplies located off of the panels, approximately 500 feet away from the panels, will be impacted by mining operations.

Not enough time has passed to indicate to what degree recovery will occur within the ground water supplies that have been impacted by the longwall mining operation. However, in the short time that has passed since the aforementioned developed supplies were undermined, the majority of the developed supplies have shown some degree of recovery. Based upon the lithologic characteristics of the overburden, it is anticipated that recovery will be possible based on the greater percentage of "soft" rock (plastic shales and clays) as compared to the lesser amount of "hard" rock (sandstones and limestones) in the overburden. The lithologic characteristics of the overburden indicate that once subsidence is completed, new saturated zones will develop within the clay and shale overburden above the mine. Water resources from some affected supplies may thus be developed subsequent to mining in strata located immediately above the next lowest saturated zone below the affected supply.

Surface waters located above full coal recovery areas may be diminished as a result of the proposed operation. It is anticipated that partial or complete recovery of surface waters will occur based upon the lithologic characteristics of the overburden which is discussed above.

The proposed operation will not result in material damage to the hydrologic balance outside the permit area, though impacts precipitated by subsidence may cause diminution or interruption of individual supplies. The degree of diminution or interruption of supplies will vary depending upon parameters such as location of the supply in relation to the longwall panel, and vertical proximity of the supply to the mine itself. Recovery and/or degree of recovery of various supplies may also be dependent on the above parameters.

The ground and surface water monitoring plan for the proposed operation may be found within the addendum to Part 3, Item E(5) of the application. Monitoring results will indicate localized impacts to specific individual ground water supplies and surface waters.

Based upon the data reviewed and the potential impact to the developed ground water supplies above the application area, the water replacement plan within the application has been designed to assure that continuous service will be provided for the ground water users within the application and adjacent areas. A detailed ground water replacement plan may be found within the addendum to Part 2, Item F(2) and the addendum to Part 3, Item J of the application.

STATE OF OHIO
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

Permit No. D-0360-1



Coal Mining & Reclamation Permit

Issued to: Ohio Valley Coal Company
56854 Pleasant Ridge Road
Alledonia, Ohio 43902
Phone Number (614) 926-1351
AREA CODE

Application No. D-0360-1
Acreage 691.0 (underground)
Effective January 18, 1991
Expires June 17, 1994

Type of Operation: Surface ☒ Underground ☐ Other ☐

LOCATION OF PERMIT AREA

Names of Landowners	T- R-	Sec.	Lot	Township	County
Not applicable since this is an underground mining operation and involves no permit area.					

This permit is issued in accordance with and subject to the provisions, conditions, and limitations of Chapter 1513 of the Revised Code and Chapters 1501.13-1, 1501.13-3 through 1501.13-14 of the Administrative Code.

The approved water monitoring plan for this permit is:

Monitor for quality at: See monitoring plan in application

Monitor for quantity at: See monitoring plan in application

OPERATOR

January 18, 1991
Date

Tim L. Dierman Sr.
Chief, Division of Reclamation

12/90

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

OPERATOR

APPROVAL OF UNDERGROUND COAL MINING PERMIT APPLICATION

1. Name of Applicant Ohio Valley Coal Company
2. Address of Applicant 56854 Pleasant Ridge Rd.
City Alliedonia State Ohio Zip 43902
3. Application Number D-0360-1
4. Number of acres in underground workings 691.0
5. Number of surface acres to be affected 0
6. The water monitoring plan for this permit shall be:

See monitoring plan in application.

Note: These monitoring requirements are separate from NPDES monitoring requirements.

7. This application is APPROVED since it (demonstrates) (~~does not demonstrate~~) and the Division (has) (~~has not~~) found that the criteria in paragraph (H) of rule 1501: 13-5-01 of the Administrative Code have been met.

Date January 18, 1991

Signed Tom L. Dieringer

D0 360 -1

TOVCC 15066

11/89

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

UNDERGROUND COAL MINING AND RECLAMATION
PERMIT APPLICATION

Applicant The Ohio Valley Coal Company

- A. Type of Operation (check appropriate space(s)):
 Shaft, Slope, Drift,
 Room and Pillar, Pillar Extraction,
 X Longwall, Combined Surface and Underground
- B. Type of Application (check appropriate space(s)):
(1) New
(2) Initial Underground Workings to Existing Permit
(3) Additional Underground Workings X
- C. Address the following if applicable:
(1) Permit Number D-0360 RENEWAL DATE: 6-19-89
(2) Date Issued 6-20-84
- D. Did a person other than an employee of the applicant prepare this application? Yes, X No. If "yes," provide:

Preparer's Name

Address

City State Zip

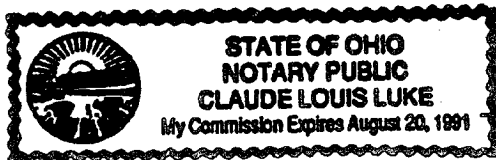
Telephone - -
- E. I, the undersigned, a responsible official of the applicant do hereby verify the information in the complete permit application as true and correct to the best of my information and belief.

Printed Name Robert E. Murray Date 12/12/90

Signature Robert E. Murray Title President & CEO

Sworn before me and subscribed in my presence this
12th day of Dec., 1990.

Claude Louis Luke
Notary Public



TOVCC 15067

P. For Revision Review Only. This item is to be completed after revisions, if any, have been made to the permit application.

I, the undersigned official of the applicant do hereby verify and acknowledge the revisions made during the permit review process as true and correct to the best of my information and belief.

Printed Name David L. Bartsch Date 12/7/90

Signature David L. Bartsch Title Project Engineer

Sworn before me and subscribed in my presence this

7th day of December, 1990.



STATE OF OHIO
NOTARY PUBLIC
CLAUDE LOUIS LUKE
My Commission Expires Aug. 20, 1991

Claude Louis Luke
Notary Public

PART I LEGAL, FINANCIAL, COMPLIANCE, AND RELATED INFORMATION

A. IDENTIFICATION OF INTERESTS

(1) Applicant's Name The Ohio Valley Coal Company

Address 56854 Pleasant Ridge Road

City Alliedonia State Ohio Zip 43902

Telephone 614 - 926 - 1351

Tax I.D. 51-255153 OR,
Social Security No. _____

(2) Is the operator of the mine to be a person different from the applicant? _____ Yes, X No. If "yes," provide the following:

Operator's Name _____

Address _____

City _____ State _____ Zip _____

Telephone _____

(3) Indicate the business structure of the applicant:

_____ Single Proprietorship, _____ Partnership,

X Corporation, _____ Association,

_____ Other - Specify _____

- A. (7) If the applicant is a business entity other than a single proprietorship, has the applicant, any partner, or principal shareholder previously operated a coal mining operation in the United States within the five year period preceding the date of this application under a name other than that in which this application is filed? X Yes, No. If "yes," list the names below:

Company Name:

The North American Coal Corporation

The Falkirk Mining Company

The Coteau Properties Company

The NACCO Mining Company (Now The Ohio Valley Coal Company)

The Sabine Mining Company

Quarto Mining Company

Doan Mining Company (Now Energy Resources, Inc.)

A. (8) (a) Provide the following information for every legal or equitable owner of record, surface and mineral, of the property to be mined on the permit area (i.e. areas affected by surface operations and facilities), indicating whether the ownership is of surface, coal, or noncoal mineral.

Name _____

Address _____

City _____ State _____ Zip _____

Surface _____, Coal _____, Noncoal _____

Deed Parcel No. _____

Name _____

Address _____

City _____ State _____ Zip _____

Surface _____, Coal _____, Noncoal _____

Deed Parcel No. _____

Name _____

Address _____

City _____ State _____ Zip _____

Surface _____, Coal _____, Noncoal _____

Deed Parcel No. _____

Name _____

Address _____

City _____ State _____ Zip _____

Surface _____, Coal _____, Noncoal _____

Deed Parcel No. _____

Not Applicable - No Permit Area

A. (8) (b) Provide the following information for every legal or equitable owner of the property to be mined covered by the underground workings indicating whether ownership is for the surface or coal.

Name Ohio Valley Coal Company
Address 56854 Pleasant Ridge Road
City Alliedonia State Ohio Zip 43902
Surface X, Coal X
Deed Parcel No. 86,89,90,92,47-6,48-2,48-1,48-3,54,50-2

Name Wayne and Barbara Ogilbee
Address 58630 Ogilbee Road
City Jacobsburg State Ohio Zip 43933
Surface X, Coal _____
Deed Parcel No. 51-1

Name Albert and Mary Ogilbee
Address 59844 Ogilbee Road
City Jacobsburg State Ohio Zip 43933
Surface X, Coal _____
Deed Parcel No. 51-1,51-2,86

Name Richard D. and Vernice Otto
Address 60263 Ogilbee Road
City Jacobsburg State Ohio Zip 43933
Surface X, Coal _____
Deed Parcel No. 47-4,47-1,47-5,47-6,47-2

A. (8) (b) Provide the following information for every legal or equitable owner of the property to be mined covered by the underground workings indicating whether ownership is for the surface or coal.

Name Delmas W. & Mary L. Caretti
Address 46100 Belmont - Centerville Rd.
City Jacobsburg State Ohio Zip 43933
Surface X, Coal _____
Deed Parcel No. 47-1, 47-4

Name Stanley R. and Bonnie L. Otto
Address 60387 Armstrong - Centerville Rd.
City Jacobsburg State Ohio Zip 43933
Surface X, Coal _____
Deed Parcel No. 47-1

Name Darrell D. and Donna M. Grant
Address 60411 Armstrong - Centerville Rd.
City Allledonia State Ohio Zip 43902
Surface X, Coal _____
Deed Parcel No. 47-1

Name Chalmer and Ida Campbell
Address 60588 Armstrong - Centerville Rd.
City Jacobsburg State Ohio Zip 43933
Surface X, Coal _____
Deed Parcel No. 91-1, 91-2, 50-1, 50-3, 47-3, 47-1

A. (8) (b) Provide the following information for every legal or equitable owner of the property to be mined covered by the underground workings indicating whether ownership is for the surface or coal.

Name Graydon and Sharon Ooten
Address 59998 Armstrong - Centerville Rd.
City Jacobsburg State Ohio Zip 43933
Surface X, Coal _____
Deed Parcel No. 47-1, 47-4

Name Seaway Coal Company
Address North Main Street
City Cadiz State Ohio Zip 43907
Surface X, Coal _____
Deed Parcel No. 87

Name Guy Blaney
Address 61860 Hunter Rd.
City Bethesda State Ohio Zip 43719
Surface X, Coal _____
Deed Parcel No. 54-1

Name Betty L. Dunfee
Address Route 2
City Jacobsburg State Ohio Zip 43933
Surface X, Coal _____
Deed Parcel No. 53-1

- A. (9) Provide the following information for the holders of record of any leasehold interest in the coal to be mined or property to be affected by surface operations or facilities, indicating whether the held interest is of surface, coal, or noncoal rights:

Name The Ohio Valley Coal Company
Address 56854 Pleasant Ridge Road
City Allledonia State OH Zip 43912
Surface X, Coal X, Noncoal _____

Name Consolidated Rail Corporation
Address P. O. Box 8538-230
City Philadelphia State PA Zip 19171
Surface X, Coal _____, Noncoal _____

Name Oglebay Norton Company
Address 1100 Superior Ave.
City Cleveland State OH Zip 44144
Surface _____, Coal X, Noncoal _____

Name _____
Address _____
City _____ State _____ Zip _____
Surface _____, Coal _____, Noncoal _____

- (10) Are there purchasers of record under a real estate contract of the coal to be mined or property to be affected by surface operations and facilities?

_____ Yes, X No. If "yes," submit Attachment 2.

- (11) Is the operator identified in item A(2) or any owner, holder, or purchaser listed in items A(8) (a and b), (9), or (10) respectively, a business entity other than a single proprietorship? X Yes, _____ No. If "yes," submit Attachment 3.

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATIONATTACHMENT 3
(IDENTIFICATION OF OTHER BUSINESS ENTITIES)Applicants's Name The Ohio Valley Coal Company

This attachment is to be completed and submitted with the permit application if the response to item A. (11) in Part 1 of the permit application is "yes". A separate attachment is to be submitted for each business entity.

Name of business entity Oglebay Norton CompanyStatutory Agent David A. KhunAddress 1100 SuperiorCity Cleveland State Ohio Zip 44114Person's Name Renold D. Thopson Position President & C.E.O.Address 1100 SuperiorCity Cleveland State Ohio Zip 44114Person's Name August F. Bradfish Position V.P., Coal & Non-FerrousAddress 1100 SuperiorCity Cleveland State Ohio Zip 44114Person's Name David A. Khun Position Corporate SecretaryAddress 1100 SuperiorCity Cleveland State Ohio Zip 44114Person's Name Richard J. Kessler Position V.P. Treas. & FinanceAddress 1100 SuperiorCity Cleveland State Ohio Zip 44114

**OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION**

**ATTACHMENT 3
(IDENTIFICATION OF OTHER BUSINESS ENTITIES)**

Applicant's Name The Ohio Valley Coal Company

This attachment is to be completed and submitted with the permit application if the response to item A. (11) in Part 1 of the permit application is "yes". A separate attachment is to be submitted for each business entity.

Name of business entity Consolidated Rail Corporation

Statutory Agent C.T. Corporation

Address 1578 Union Commerce Building

City Cleveland State Ohio Zip 44115

Person's Name L. S. Cranz Position Chairman

Address Penn Center Plaza

City Philadelphia State PA Zip 19104

Person's Name R. D. Sanborn Position President & C.O.D.

Address Penn Center Plaza

City Philadelphia State PA Zip 19104

Person's Name H. W. Brown Position Sr. V.P. Finance

Address Penn Center Plaza

City Philadelphia State PA Zip 19104

Person's Name B. B. Wilson Position Sr. V.P., Law

Address Penn Center Plaza

City Philadelphia State PA Zip 19104

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATIONATTACHMENT 3
(IDENTIFICATION OF OTHER BUSINESS ENTITIES)Applicants's Name The Ohio Valley Coal Company

This attachment is to be completed and submitted with the permit application if the response to item A. (11) in Part 1 of the permit application is "yes". A separate attachment is to be submitted for each business entity.

Name of business entity The Ohio Valley Coal CompanyStatutory Agent A. & H. StatutoryAddress 1100 Huntington BuildingCity Cleveland State Ohio Zip 44115Person's Name Robert E. Murray Position President & C.E.O.Address 56854 Pleasant Ridge RoadCity Alliedonia State Ohio Zip 43902Person's Name Stephen C. Ellis Position SecretaryAddress 56854 Pleasant Ridge RoadCity Alliedonia State Ohio Zip 43902

Person's Name _____ Position _____

Address _____

City _____ State _____ Zip _____

Person's Name _____ Position _____

Address _____

City _____ State _____ Zip _____

**OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION****ATTACHMENT 3
(IDENTIFICATION OF OTHER BUSINESS ENTITIES)**Applicant's Name The Ohio Valley Coal Company

This attachment is to be completed and submitted with the permit application if the response to item A. (11) in Part I of the permit application is "yes". A separate attachment is to be submitted for each business entity.

Name of business entity Seaway II Coal CompanyStatutory Agent C. T. Corporation SystemsAddress 925 Euclid Ave.City Cleveland State Ohio Zip 44226Person's Name Jack L. Mahaffey Position Chairman of the BoardAddress P. O. Box 2906City Houston, State Texas Zip 77252Person's Name W. H. Woods Position V.P. - LegalAddress P. O. Box 2906City Houston State Texas Zip 77252Person's Name D. F. Kenting Position TreasurerAddress P. O. Box 2906City Houston State Texas Zip 77252Person's Name J. L. Huth Position ControllerAddress 518 North Main St.City Cadiz, State Ohio Zip 43907

- A. (12) Is any part of the proposed permit area adjacent to any lands which are not owned by those persons identified in item A(8)(a)? Yes, No. If "yes," submit Attachment 4.
Not Applicable - No Permit Area
- (13) Has the applicant or any person listed in item A(7) held a coal mining permit in the five year period prior to the date of this application?
 X Yes, No. If "yes," submit Attachment 5.
- (14) Does the applicant or any person listed in item A(7) have any coal mining permit applications pending in the United States? X Yes, No. If "yes," submit Attachment 23.
- (15) Name of this mine Powhatan No. 6 Mine
- (16) List below the MSHA identification numbers for the mine and for all mine-associated structures requiring MSHA approval on the proposed permit area.

33-01159

- (17) Does the applicant hold lands, interests in lands, options, or pending bids on interests for lands which are contiguous to the property to be mined?
 X Yes, No. If "yes," submit as an addendum to the permit application, a description of the lands.
See R-0360-2; Proposed Future Permit Sequencing Map
- (18) Is it anticipated that individual mining permits will be sought for any of those lands described in item (17) above? X Yes, No. If "yes," identify those lands to include the size, sequence, and timing of future mining permits, utilizing a map pursuant to 1501:13-4-13(J)(29).
See R-0360-2; Proposed Future Permit Sequencing Map
- (19) List below the person or persons primarily responsible for ensuring that the applicant will comply with Chapter 1513. of the Revised Code and the rules adopted pursuant thereto while mining and reclaiming the area for which this permit is requested.

Robert E. Murray

- (20) Submit Attachment 22, Certificate of Liability Insurance.

A LIST OF CURRENT OR PREVIOUS SURFACE COAL MINING
PERMITS HELD IN U.S. SINCE 1970 BY APPLICANT AND BY
PRINCIPAL SHAREHOLDERS AND AUTHORITY ISSUING THE PERMIT

THE NORTH AMERICAN COAL CORPORATION - EASTERN DIVISION

Mining Permit:

Date Approved:

101857-39A-78BC4-01-1	September 4, 1981
101857-39A-78BC4-01-2	March 26, 1982
101857-328-101-04-01-0C	December 9, 1981
101857-328-00119-01-0C	June 16, 1981
101857-328-00119-09-1	October 16, 1981
101857-328-10115-01-0	August 13, 1982
101857-328-10115-02-0	August 13, 1982
101851-328-10106-01-0	November 1, 1982
32813021	April 9, 1984
32783-62	May 9, 1985
32830103	June 27, 1986

Issued by: The Department of Environmental Resources
Division of Reclamation
Harrisburg, Pennsylvania

Eastern Division update 8/10/87

THE NORTH AMERICAN COAL CORPORATION - WESTERN DIVISION
INDIAN HEAD MINE

Mining Permit:

Date Approved:

10	December 31, 1969
18	December 8, 1972
21	August 22, 1973
25	April 19, 1974
31	February 26, 1976
42	April 5, 1977
NAIH 7905	April 16, 1980
NAIH 8001 (Section 35)	April 11, 1980
NAIH 8103	June 1, 1982
NAIH 8201	June 1, 1982
NAIH 8306	July 11, 1984
NAIH 8504	February 3, 1987

Issued by: The North Dakota Public Service Commission
Reclamation and Siting Division
Bismarck, North Dakota

Mining Permit:

Date Approved:

NAIH 7905

April 16, 1980
September 18, 1980
September 19, 1980
May 1, 1987

NAIH 8504

Issued by: The Office of Surface Mining
Reclamation and Enforcement
U.S. Department of the Interior
Region V, Denver, Colorado

THE FALKIRK MINING COMPANY - FALKIRK MINE

Mining Permit:

40
NAFK 8005
NAFK 8010
NAFK 8104
NAFK 8305
NAFK 8402
NAFK 8405

Date Approved:

July 17, 1978
October 5, 1981
April 28, 1981
October 24, 1982
May 10, 1984
April 10, 1985
April 15, 1986

Issued by: The North Dakota Public Service Commission
Reclamation and Siting Division
Bismarck, North Dakota

THE COTEAU PROPERTIES COMPANY - FREEDOM MINE

Mining Permit:

46
NACT 8102
NACT 8203
NACT 8401
NACT 8503
NACT 8601

Date Approved:

April 12, 1978
October 5, 1981
July 7, 1983
July 3, 1984
August 7, 1986
July 28, 1987

Issued by: The North Dakota Public Service Commission
Reclamation and Siting Division
Bismarck, North Dakota

Western Division Update - 8/10/87

THE NORTH AMERICAN COAL CORPORATION - CENTRAL DIVISION
THE NACCO MINING COMPANY - POWHATAN NO. 6 MINE

Mining Permit:
D-0360

Date Approved:
June 20, 1984

Issued by: The Ohio Department of Natural Resources
Division of Reclamation
Columbus, Ohio

Central Division Update - 8/10/87

THE NORTH AMERICAN COAL CORPORATION - SOUTHWESTERN DIVISION
THE SABINE MINING COMPANY - SOUTH HALLSVILLE NO. 1 MINE

Mining Permit:
13
24 (pending)

Date Approved:
May 9, 1986

Issued by: Railroad Commission of Texas, Surface
Mining and Reclamation Division
Fortworth, Texas

**OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION**

**ATTACHMENT 23
(PENDING PERMIT APPLICATIONS)**

Applicant's Name The Ohio Valley Coal Company

This attachment is to be completed and submitted with the permit application if the response to item A.(14) in Part 1 of the permit application is "yes."

Indicate the business entity for which this listing has been completed The Ohio Valley Coal Company

Application No.	Name of Regulatory Agency	State
D-0360-1	ODNR	Ohio

**OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION**

**ATTACHMENT 23
(PENDING PERMIT APPLICATIONS)**

Applicant's Name The Ohio Valley Coal Company

This attachment is to be completed and submitted with the permit application if the response to item A. (14) in Part 1 of the permit application is "yes."

Indicate the business entity for which this listing has been completed Energy Resources, Incorporated

Application No.	Name of Regulatory Agency	State
24890108	Dept. of Environmental Resources	PA
24900102	Dept. of Environmental Resources	PA
24900103	Dept. of Environmental Resources	PA
24900104	Dept. of Environmental Resources	PA

**OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION**

**ATTACHMENT 23
(PENDING PERMIT APPLICATIONS)**

Applicant's Name The Ohio Valley Coal Company

This attachment is to be completed and submitted with the permit application if the response to item A. (14) in Part 1 of the permit application is "yes."

Indicate the business entity for which this listing has been completed The Hocking Valley Resources Company

Application No.	Name of Regulatory Agency	State
1142	ODNR-DOR	04

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 23
(PENDING PERMIT APPLICATION)

Applicant's Name The Ohio Valley Coal Company

This attachment is to be completed and submitted with the permit application if the response to item A.(14) in Part 1 of the permit application is "yes".

Indicate the business entity for which this listing has been completed The Sabine Mining Co.

Application No.	Name of Regulatory Agency	State
None		

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 23
(PENDING PERMIT APPLICATION)

Applicant's Name The Ohio Valley Coal Company

This attachment is to be completed and submitted with the permit application if the response to item A.(14) in Part 1 of the permit application is "yes".

Indicate the business entity for which this listing has been completed The Falkirk Mining Co.

Application No.	Name of Regulatory Agency	State
None		

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 23
(PENDING PERMIT APPLICATION)

Applicant's Name The Ohio Valley Coal Company

This attachment is to be completed and submitted with the permit application if the response to item A.(14) in Part 1 of the permit application is "yes".

Indicate the business entity for which this listing has been completed The Coteau Properties Co.

Application No.	Name of Regulatory Agency	State
NACT 9001	North Dakota Public Service Com.	North Dakota

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 23
(PENDING PERMIT APPLICATION)

Applicant's Name The Ohio Valley Coal Company

This attachment is to be completed and submitted with the permit application if the response to item A.(14) in Part 1 of the permit application is "yes".

Indicate the business entity for which this listing has been completed The North American Coal Corporation

Application No.	Name of Regulatory Agency	State
None		

TOTAL ACREAGE = 691 ACRES

LOCATION MAP

0 1 2 miles

N

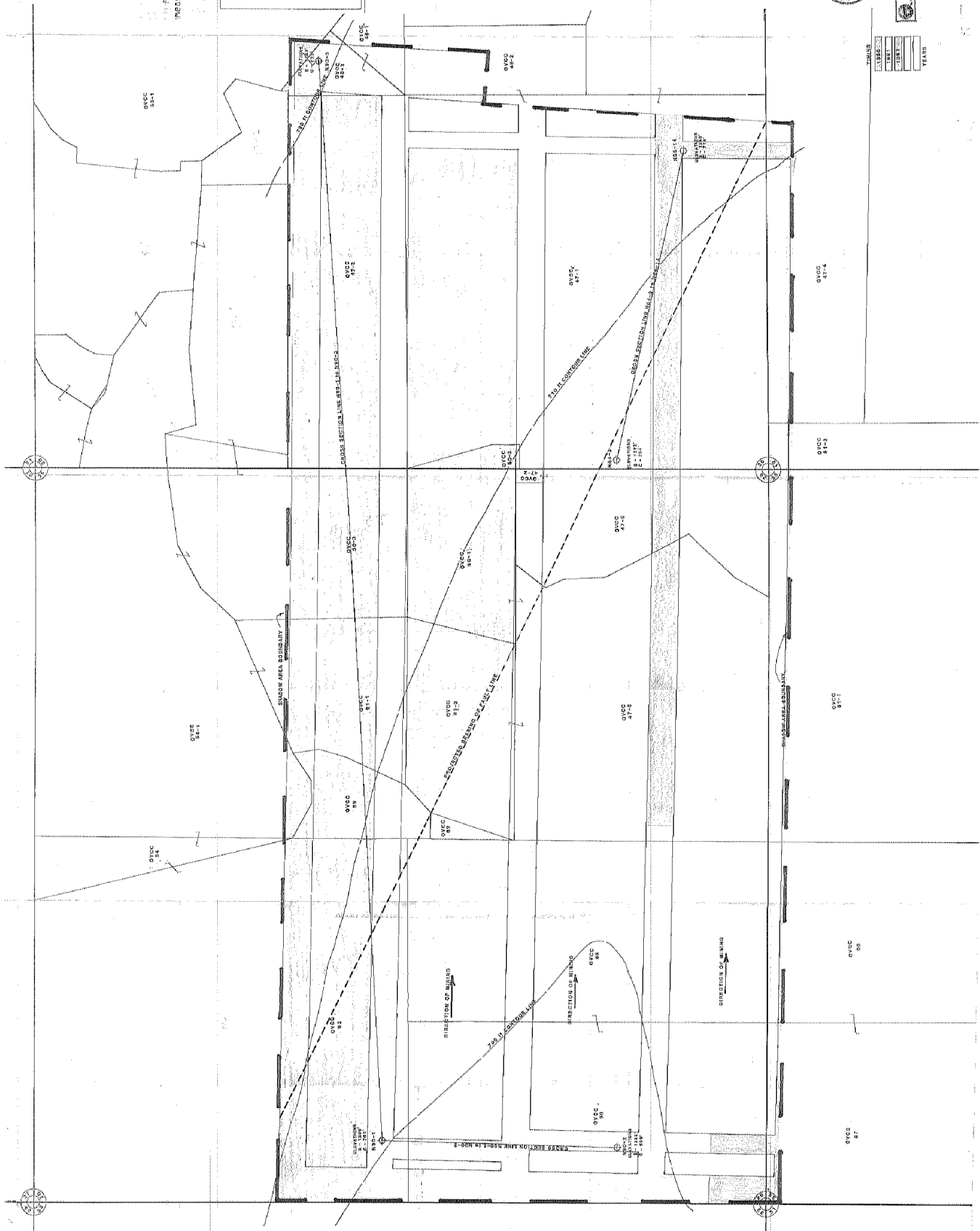
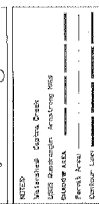
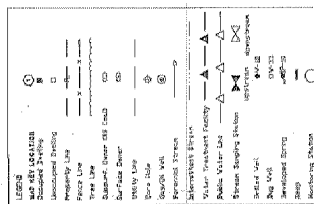
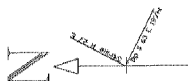
WASHINGTON D.C.

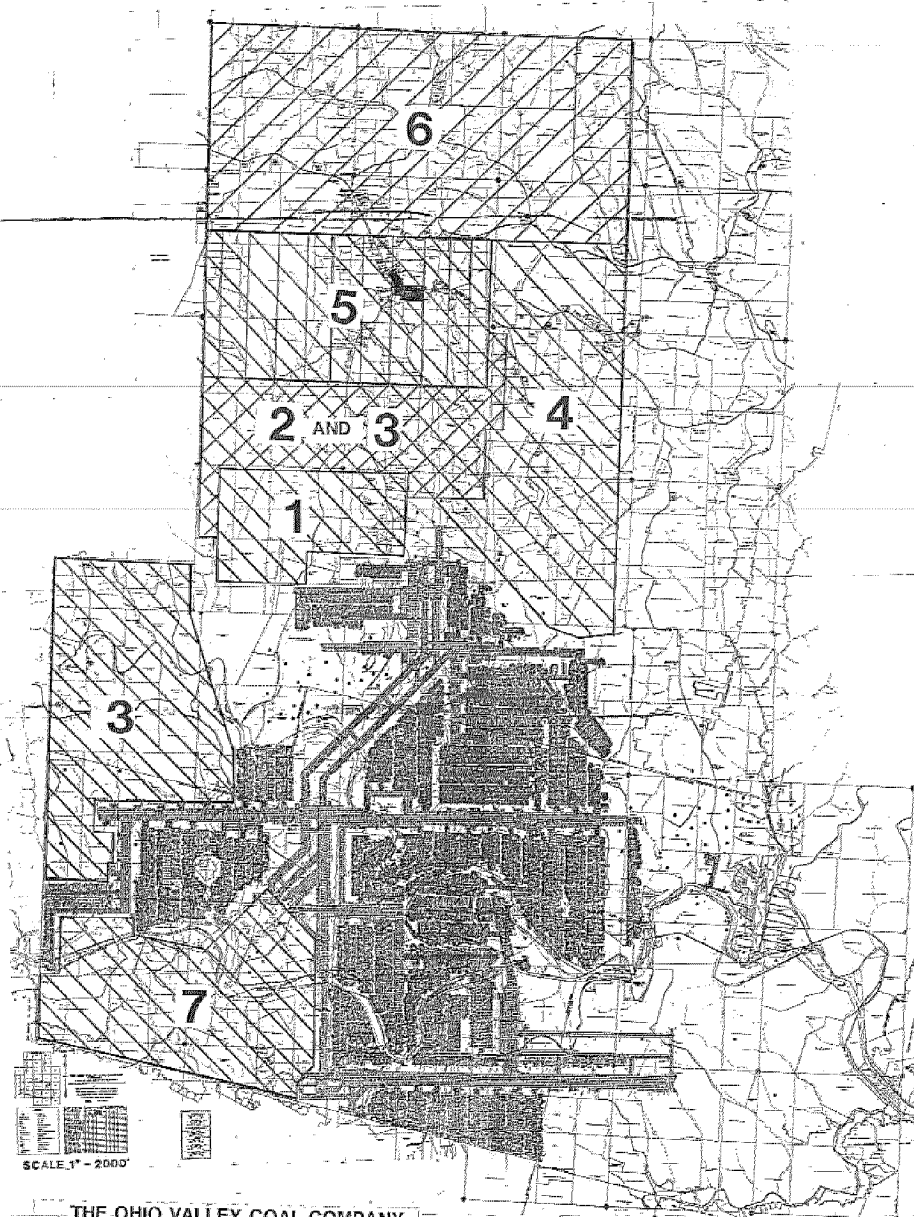
SMITH TWP

WATER

32 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1





THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
PERMIT NO. D-0360
PROPOSED FUTURE PERMIT SEQUENCING
Addendum to Part 1, PAGE 3, A(17)

NUMBER INDICATES PERMIT SEQUENCE

NOTE: AREAS THAT ARE SHOWN ARE
APPROXIMATE LOCATIONS AND MAY CHANGE
DUE TO CHANGES IN MINING PLAN

EXCEPTED - WILL NOT BE PERMITTED

1 APPROXIMATE AREA OF M-0000-1

TIMING INFORMATION	
SEQUENCE NUMBER	APPROXIMATE TIMING
1	Approved 12-89
2	Approved 10-90
3	Approval Needed 12-90
A	Approval Needed 8-92
5	Approval Needed 8-94
6	Approval Needed 8-96
7	Approval Needed 8-99

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 22
(CERTIFICATE OF LIABILITY INSURANCE)

Name of Insured The Ohio Valley Coal Company

This is to certify that the policy of insurance listed below has been issued to the above named insured and is in force at this time. The policy provides bodily injury and property damage insurance for all coal mining and reclamation operations of the insured in the State of Ohio as required by paragraph (B) of rule 1501:13-7-07 of the Administrative Code stated below.

Name of Insurer Federal Insurance Company
Policy Number (91)7317-08-88
Policy Period 5-25-90 to 6-1-91
Name of Underwriting Agent Reschini Agency, Inc.
Address of Underwriting Agent P. O. Box 449, Indiana, PA 15701
Telephone No. of Underwriting Agent 412-349-1300

In the event of cancellation or non-renewal of this policy, including non-payment of policy premiums, the insurer agrees to promptly notify: The Division of Reclamation, Fountain Square, Columbus, Ohio 43224.

4-17-90

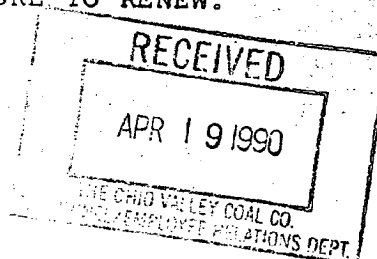
Date

[Signature]
Signature of Underwriting Agent

This certificate is issued as a matter of information only and confers no rights upon the Division of Reclamation. This certificate does not amend, extend, or alter the coverage afforded by the policy listed above.

1501:13-7-07(B) THE PUBLIC LIABILITY INSURANCE POLICY SHALL:

- (1) BE IN EFFECT DURING THE TERM OF THE PERMIT OR ANY RENEWAL, INCLUDING THE LENGTH OF ALL RECLAMATION OPERATIONS;
- (2) PROVIDE FOR PERSONAL INJURY AND PROPERTY DAMAGE PROTECTION IN AMOUNTS ADEQUATE TO COMPENSATE ANY PERSONS INJURED OR PROPERTY DAMAGED AS A RESULT OF COAL MINING AND RECLAMATION OPERATIONS, INCLUDING THE USE OF EXPLOSIVES. THE MINIMUM INSURANCE COVERAGE FOR BODILY INJURY AND PROPERTY DAMAGE SHALL BE THREE HUNDRED THOUSAND DOLLARS FOR EACH OCCURRENCE AND FIVE HUNDRED THOUSAND DOLLARS IN THE AGGREGATE; AND
- (3) INCLUDE A RIDER REQUIRING THAT THE INSURER NOTIFY THE CHIEF WHENEVER SUBSTANTIVE CHANGES ARE MADE IN THE POLICY, INCLUDING ANY TERMINATION OR FAILURE TO RENEW.



COPY

B. Compliance Information

(1) Has the applicant, any subsidiary, affiliate, or persons controlled by or under common control with the applicant, any partner if the applicant is a partnership, any officer, principal shareholder, or director if the applicant is a corporation, or any other person who has a right to control or in fact controls the management of the applicant or the selection of officers, directors, or managers of the applicant:

(a) Ever held a federal or state coal mining permit that in the five-year period prior to the date of submission of this application has been suspended or revoked or had a coal mining bond or similar security deposited in lieu of bond forfeited?
 Yes, X No. If "yes," submit Attachment 6.

(b) Been an officer, partner, director, principal shareholder, or person having the right to control or has in fact controlled the management of the selection of officers, directors, or managers of a business entity that has had a federal or state mining permit which:

i) in the five-year period prior to the date of submission of this application has been suspended or revoked?

 Yes, X No.

ii) ever had a mining bond or similar security deposited in lieu of bond forfeited?

 Yes, X No.

If "yes" to either i) or ii), submit Attachment 6.

(2) Has the applicant, or any subsidiary, affiliate, or persons controlled by or under common control with the applicant, incurred notices of violation of any law, rule or regulation of the United States or of any department or agency thereof or of any state pertaining to air or water environmental protection in connection with any coal mining operation during the three year period prior to the date of this application?

 X Yes, No. If "yes," submit Attachment 7.

9/80

**OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION**

**ATTACHMENT 7
(NOTICES OF VIOLATION)**

Applicant's Name The Ohio Valley Coal Company

Violation Number	Date of Issuance	Issuing Agency	State	Brief Description of N.O.V.	Action Taken to Abate N.O.V.	Current Status of N.O.V. (1)
18811	3-25-85	ODNR	OH	Improper Bond Amount	--	Vacated
12681	11-14-85	ODNR	OH	Disch. of Water 4.5 pH	Drainage Corrected	Terminated
12787	3-12-86	ODNR	OH	Insp. Reports not available	Reporting Initiated	Terminated
12990	11-12-87	ODNR	OH	Ground Water Monitoring Report not received	Non-Remedial	
12991	11-12-87	ODNR	OH	Surf. Water Reports not received	Non-Remedial	
22522	3-29-90	ODNR	OH	Wrong Mining Method	Submit ARP	Terminated

(1) If administrative or judicial proceedings have been initiated concerning any of the violations, identify the violation and provide an addendum indicating the date, location, type of proceeding, and status.

TOVCC 15094

9/88

**OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION**

**ATTACHMENT 7
(NOTICES OF VIOLATION)**

Applicant's Name The Ohio Valley Coal Company
This report filed for Energy Resources, Inc.

Violation Number	Date of Issuance	Issuing Agency	State	Brief Description of N.O.V.	Action Taken to Abate N.O.V.	Current Status of N.O.V. (1)
87-K-191S	8/20/87	DER	PA	Failure to maintain adequate erosion and sedimentation controls	Erosion and sedimentation controls repaired	Abated
87-K-209S	9/21/87	DER	PA	Discharge of water with manganese concentration of 6.92 mg/l	Pond being treated to meet discharge requirements	Abated
87-K-233S	10/15/87	DER	PA	Failure to maintain and construct haul road to prevent erosion and steepness as an unsafe condition; failure to construct and maintain treatment ponds capable of treating run-off from 10 year, 24 hour precipitation event; failure to remove, segregate and protect topsoil; failure to construct and maintain adequate erosion and sedimentation controls.	Haul road repaired and realigned, treatment ponds reworked, topsoil segregated, erosion and sedimentation controls corrected	Abated

(1) If administrative or judicial proceedings have been initiated concerning any of the violations, identify the violation and provide an addendum indicating the date, location, type of proceeding, and current status.

TOVCC 15095

9/88

**OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION**

**ATTACHMENT 7
(NOTICES OF VIOLATION)**

Applicant's Name The Ohio Valley Coal Company
This report filed for Energy Resources, Inc.

Violation Number	Date of Issuance	Issuing Agency	State	Brief Description of N.O.V.	Action Taken to Abate N.O.V.	Current Status of N.O.V. (1)
87-K-234S	10/15/87	DER	PA	Failure to place topsoil on stable area; conducting surface mining within 100 feet of stream; failure to construct and maintain adequate erosion and sedimentation controls; failure to construct erosion and sedimentation pond.	Topsoil placed on stable area; area regraded and stabilized; collected ditch regraded; erosion and sedimentation pond installed	Abated
87-K-055S	4/18/88	DER	PA	Ponds discharging water with manganese of 16.0 mg/L and 6.5 mg/L	Ponds being treated to meet discharge requirements	Abated
88-K-091S	6/8/88	DER	PA	Ponds discharging water with manganese of 6.19 mg/L and 10.3 mg/L.	Ponds being treated to meet discharge requirements	Abated
88-K-117S	8/11/88	DER	PA	Failure to backfill concurrent with mining, inadequate backfill equipment	Backfill in satisfactory progress	Abated
88-K-116S	8/11/88	DER	PA	Failure to backfill concurrent with mining	Backfill in satisfactory progress	Abated

(1) If administrative or judicial proceedings have been initiated concerning any of the violations, identify the violation and provide an addendum indicating the date, location, type of proceeding, and current status.

9/88

**OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION**

**ATTACHMENT 7
(NOTICES OF VIOLATION)**

Applicant's Name The Ohio Valley Coal Company

This report filed for Energy Resources, Inc.

Violation Number	Date of Issuance	Issuing Agency	State	Brief Description of N.O.V.	Action Taken to Abate N.O.V.	Current Status of N.O.V. (1)
89-K-097S	5/26/89	DER	PA	Pond discharge with a pH of 5.10 and Manganese of 19.6 mg/L	Pond water was not allowed to discharge and was treated until discharge limitations were met	Abated
89-K-101S	5/23/89	DER	PA	Pond discharge with manganese of 7.5 mg/L	Pond water was not allowed to discharge and was treated until discharge effluent limitations were met	Abated
89-K-143S	7/18/89	DER	PA	Failure to construct proper E & S controls prior to disturbing an area	Proper E & S controls were established	Abated
89-K-178S	8/08/89	DER	PA	Discharge of water with iron of 16.6 mg/l and manganese of 17.2 mg/l	Bonded area was extended to encompass natural treatment of non-compliance discharge	Abated
89-K-223S	10/03/89	DER	PA	Discharge of water with iron of 9.9 mg/l	Seep water was pumped to an approved facility	Abated

(1) If administrative or judicial proceedings have been initiated concerning any of the violations, identify the violation and provide an addendum indicating the date, location, type of proceeding, and current status.

TOVCC 15097

9/88

**OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION**

**ATTACHMENT 7
(NOTICES OF VIOLATION)**

Applicant's Name The Ohio Valley Coal Company
This report filed for Energy Resources, Inc.

Violation Number	Date of Issuance	Issuing Agency	State	Brief Description of N.O.V.	Action Taken to Abate N.O.V.	Current Status of N.O.V. (1)
88-K-160S	11/9/88	DER	PA	Failure to properly handle acid and toxic forming material	Pit cleanings properly buried	Abated
88-K-170S	11/22/88	DER	PA	Failure to barricade and guard public highways and all entrances to the operation within 1000' of the blast	Barricade and guarded public highways and all entrances to the operation within 1000' of the blast	Abated
89-K-034S	3/16/89	DER	PA	Failure to maintain adequate erosion and sedimentation control measures	Erosion and sedimentation controls repaired	Abated
89-K-050S	3/28/89	DER	PA	Failure to maintain adequate treatment	Pond being treated to meet discharge requirements and discharge flow being controlled to meet required dilution ratio	Abated

(1) If administrative or judicial proceedings have been initiated concerning any of the violations, identify the violation and provide an addendum indicating the date, location, type of proceeding, and current status.

TOVCC 15098

9/88

**OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION**

**ATTACHMENT 7
(NOTICES OF VIOLATION)**

Applicant's Name The Ohio Valley Coal Company
This report filed for Energy Resources, Inc.

Violation Number	Date of Issuance	Issuing Agency	State	Brief Description of N.O.V.	Action Taken to Abate N.O.V.	Current Status of N.O.V. (1)
90-K-008S	01/18/90	DER	PA	Failure to maintain adequate E & S control	Water was diverted to an approved facility	Abated
90-K-027S	02/12/90	DER	PA	Failure to pump pit water to an approved facility (Hose broke)	Pump was shut down, hose was repaired, and pumping was resumed to an approved facility	Abated
90-K-032S	02/15/90	DER	PA	Failure to backfill and regrade concurrent with mining	Backfilling resumed according to reclamation schedule approved by the Department	Abated
90-K-035S	02/20/90	DER	PA	Allowing water to accumulate in pit area	Water was pumped to an approved facility	Abated
90-K-037S	02/23/90	DER	PA	Cessation Order, failure to comply to compliance order 90-K-035S	Water was pumped to an approved facility	Abated
90-K-039S	03/01/90	DER	PA	Failure to backfill and regrade concurrent with mining	Backfilling resumed according to reclamation schedule approved by the Dept.	Abated

(1) If administrative or judicial proceedings have been initiated concerning any of the violations, identify the violation and provide an addendum indicating the date, location, type of proceeding, and current status.

TOVCC 15099

9/88

**OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION**

**ATTACHMENT 7
(NOTICES OF VIOLATION)**

Applicant's Name The Ohio Valley Coal Company
This report filed for Energy Resources, Inc.

Violation Number	Date of Issuance	Issuing Agency	State	Brief Description of N.O.V.	Action Taken to Abate N.O.V.	Current Status of N.O.V. (1)
90-K-054S	04/24/90	DER	PA	Pond discharge in excess of 70 mg/l suspended solids	Treatment was upgraded	Abated
90-K-076S	05/16/90	DER	PA	Pond discharges below effluent standards	Treatment was upgraded	Abated
90-K-084S	05/23/90	DER	PA	Failure to maintain adequate E & S controls	E & S controls were repaired	Abated
90-K-136S	07/20/90	DER	PA	Pond discharge below effluent standards	Treatment was upgraded	Abated
90-K-138S	07/23/90	DER	PA	Failure to seal drill holes, failure to save topsoil, failure to maintain E & S controls, failure to backfill concurrently, encroachment on stream barrier	Drill holes were sealed, topsoil was saved, E & S controls were repaired, backfilling started, stream barrier was backfilled and seeded	Abated
90-K-139S	7/23/90	DER	PA	Failure to maintain E & S controls; failure to backfill concurrently	E & S controls were repaired, backfilling started	Abated

(1) If administrative or judicial proceedings have been initiated concerning any of the violations, identify the violation and provide an addendum indicating the date, location, type of proceeding, and current status.

9/88

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 7
(NOTICES OF VIOLATION)

Applicant's Name The Ohio Valley Coal Company
Report Filed for Energy Resources, Inc.

Violation Number	Date of Issuance	Issuing Agency	State	Brief Description of N.O.V.	Action Taken to Abate N.O.V.	Current Status of N.O.V. (1)
90-K-143S	7/26/90	DER	PA	Failure to maintain E & S controls, failure to mulch regraded area	E & S controls were repaired, mulch was applied	Abated
90-K-145S	8/1/90	DER	PA	Extension for portion of Order No. 90-K-138S	E & S pond was completed, backfilling was started	Abated

(1) If administrative or judicial proceedings have been initiated concerning any of the violations, identify the violation and provide an addendum indicating the date, location, type of proceeding, and current status.

9/88

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 7
(NOTICES OF VIOLATION)

Applicant's Name The Ohio Valley Coal Company

This report field for The Falkirk Mining Company

Violation Number	Date of Issuance	Issuing Agency	State	Brief Description of N.O.V.	Action Taken to Abate N.O.V.	Current Status of N.O.V. (1)
87-469	06-22-87	NDSDH	North Dakota	Failure to meet effluent quality standards for discharge at two NPDES discharge points.	Required to operate under consent agreement from 08-10-87 through 08-10-88.	Terminated

(1) If administrative or judicial proceedings have been initiated concerning any of the violations, identify the violation and provide an addendum indicating the date, location, type of proceeding, and current status.

9/88

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 7
(NOTICES OF VIOLATION)

Applicant's Name The Ohio Valley Coal Company

This report filed for The Sabine Mining Company

Violation Number	Date of Issuance	Issuing Agency	State	Brief Description of N.O.V.	Action Taken to Abate N.O.V.	Current Status of N.O.V. (1)
V1-87-087	02-27-87	USEPA	Texas	Effluent exceedances	Treatment implemented	Terminated

(1) If administrative or judicial proceedings have been initiated concerning any of the violations, identify the violation and provide an addendum indicating the date, location, type of proceeding, and current status.

9/88

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 7
(NOTICES OF VIOLATION)

Applicant's Name The Ohio Valley Coal Company

This report filed for The North American Coal Corporation

Violation Number	Date of Issuance	Issuing Agency	State	Brief Description of N.O.V.	Action Taken to Abate N.O.V.	Current Status of N.O.V. (1)
8703	4-03-87	NDPSC	North Dakota	Uncontrolled discharge	Embankment repaired	Terminated
8801	07-13-88	NDPSC	North Dakota	Failure to retain sediment within disturbed area, contamination at SPGM	Cleaned sump constructed two diversions	Terminated

(1) If administrative or judicial proceedings have been initiated concerning any of the violations, identify the violation and provide an addendum indicating the date, location, type of proceeding, and current status.

RIGHT OF ENTRY INFORMATION

C. (1) (a) Provide either of the following to allow for coal mining operations on the permit area.

- (i) A copy of the documents, or
- (ii) An affidavit wherein the documents are described.

AFFIDAVIT

State of Ohio, _____ County, ss. _____ being first duly sworn, says that the following described documents convey to the applicant the legal right explained below and is a subject of litigation as shown below.

Type of document _____

Execution Date _____

Expiration Date _____

Parties: From _____ To _____

Description of land: No. Acres _____

County _____ Township _____

Sections _____ Lots _____

Parcel # _____

Explanation of legal rights claimed _____

Pending litigation _____ Yes, _____ No.

Signature of Affiant _____ Date _____

Position _____

Sworn before me and subscribed in my presence this _____ day of _____, 19____.

Notary Public

Not Applicable - No Permit Area

RIGHT OF ENTRY INFORMATION

C. (1) (b) Provide either of the following to allow for coal mining operations within the underground workings.

- (i) A copy of the documents, or
- (ii) An affidavit wherein the documents are described. For all documents or affidavits provided for the underground workings, the specific parcels are to be identified on the application map.

AFFIDAVIT

State of Ohio, Belmont County, ss. David L. Bartsch being first duly sworn, says that the following described documents convey to the applicant the legal right explained below and is a subject of litigation as shown below.

Type of document Warranty Deed

Execution Date December 29, 1970

Expiration Date --

Parties: From The North American Coal Corporation To The Nacco Mining Company

Description of land: No. Acres

County Belmont Township Smith

Sections 20 Lots

Parcel # 48-1, 48-2, 48-3

Explanation of legal rights claimed See Addendum to Page 11, Part 1, C(1)(b), Item 9

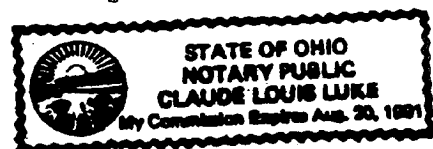
Pending litigation Yes, X No.

David L. Bartsch 4-27-90
Signature of Affiant Date

Project Engineer
Position

Sworn before me and subscribed in my presence this 27th day of April, 19 90.

Claude Louis Luke
Notary Public



RIGHT OF ENTRY INFORMATION

C. (1) (b) Provide either of the following to allow for coal mining operations within the underground workings.

- (i) A copy of the documents, or
- (ii) An affidavit wherein the documents are described. For all documents or affidavits provided for the underground workings, the specific parcels are to be identified on the application map.

AFFIDAVIT

David L.

State of Ohio, Belmont County, ss. Bartsch being first duly sworn, says that the following described documents convey to the applicant the legal right explained below and is a subject of litigation as shown below.

Type of document Warranty Deed

Execution Date December 29, 1970

Expiration Date --

Parties: From The North American Coal Corporation To The Nacco Mining Company

Description of land: No. Acres

County Belmont Township Smith

Sections 26 Lots

Parcel # 90

Explanation of legal rights claimed See Addendum
to Page 11, Part 1, C(1)(b) , Item 10

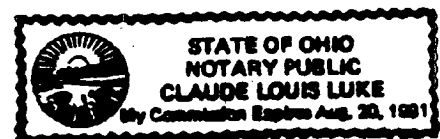
Pending litigation Yes, X No.

David L. Bartsch 4-27-90
Signature of Affiant Date

Project Engineer
Position

Sworn before me and subscribed in my presence this
27th day of APRIL, 1990.

Claude Louis Luke
Notary Public



RIGHT OF ENTRY INFORMATION

C. (1)(b) Provide either of the following to allow for coal mining operations within the underground workings.

- (i) A copy of the documents, or
- (ii) An affidavit wherein the documents are described. For all documents or affidavits provided for the underground workings, the specific parcels are to be identified on the application map.

AFFIDAVIT

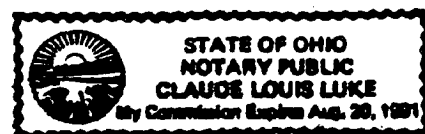
State of Ohio, Belmont County, ss. David L. Bartsch being first duly sworn, says that the following described documents convey to the applicant the legal right explained below and is a subject of litigation as shown below.

Type of document Warranty Deed
Execution Date December 29, 1970
Expiration Date --
Parties: From The North American Coal Corporation To The Nacco Mining Company
Description of land: No. Acres _____
County Belmont Township Smith
Sections 26 Lots _____
Parcel # 89
Explanation of legal rights claimed See Addendum
to Page 11, Part 1. C(1)(b), Item 11
Pending litigation Yes, X No.

David L. Bartsch 4-27-90
Signature of Affiant Date
Project Engineer
Position

Sworn before me and subscribed in my presence this
27th day of April, 19 90.

Claude Louis Luke
Notary Public



RIGHT OF ENTRY INFORMATION

C. (1)(b) Provide either of the following to allow for coal mining operations within the underground workings.

- (i) A copy of the documents, or
- (ii) An affidavit wherein the documents are described. For all documents or affidavits provided for the underground workings, the specific parcels are to be identified on the application map.

AFFIDAVIT

State of Ohio, Belmont County, ss. David L. Bartsch being first duly sworn, says that the following described documents convey to the applicant the legal right explained below and is a subject of litigation as shown below.

Type of document Warranty Deed

Execution Date December 29, 1970

Expiration Date --

Parties: From The North American Coal Corporation To The Nacco Mining Company

Description of land: No. Acres

County Belmont Township Smith

Sections 25 Lots

Parcel # 86

Explanation of legal rights claimed See Addendum
to Page 11, Part 1, C(1)(b), Item 1

Pending litigation X Yes, No.

*Under the Albert and Mary Ogilbee property.

David L. Bartsch 4-27-90
Signature of Affiant Date

Project Engineer
Position

Sworn before me and subscribed in my presence this
27th day of APRIL, 1990.

Claude Louis Luke
Notary Public



RIGHT OF ENTRY INFORMATION

C. (1)(b) Provide either of the following to allow for coal mining operations within the underground workings.

- (i) A copy of the documents, or
- (ii) An affidavit wherein the documents are described. For all documents or affidavits provided for the underground workings, the specific parcels are to be identified on the application map.

AFFIDAVIT

State of Ohio, Belmont County, ss. David L. Bartsch being first duly sworn, says that the following described documents convey to the applicant the legal right explained below and is a subject of litigation as shown below.

Type of document Warranty Deed
Execution Date December 29, 1970
Expiration Date --
Parties: From The North American Coal Corporation To The Nacco Mining Company
Description of land: No. Acres _____
County Belmont Township Smith
Sections 25 Lots _____
Parcel # 87
Explanation of legal rights claimed See Addendum to Page 11, Part 1, C(1)(b), Item 2
Pending litigation Yes, ☒ No.

David L. Bartsch 4-27-90
Signature of Affiant Date

Project Engineer
Position

Sworn before me and subscribed in my presence this 27th day of APRIL, 1990.

Claude Louis Luke
Notary Public



RIGHT OF ENTRY INFORMATION

C. (1) (b) Provide either of the following to allow for coal mining operations within the underground workings.

- (i) A copy of the documents, or
- (ii) An affidavit wherein the documents are described. For all documents or affidavits provided for the underground workings, the specific parcels are to be identified on the application map.

AFFIDAVIT

David L.

State of Ohio, Belmont County, ss. Bartsch being first duly sworn, says that the following described documents convey to the applicant the legal right explained below and is a subject of litigation as shown below.

Type of document Warranty Deed

Execution Date December 29, 1970

Expiration Date --

Parties: From The North American Coal Corporation To The Nacco Mining Company

Description of land: No. Acres

County Belmont Township Smith

Sections 25 Lots

Parcel # 51-1

Explanation of legal rights claimed See Addendum
to Page 11, Part 1, C(1)(b), Item 3

Pending litigation X Yes,* No.

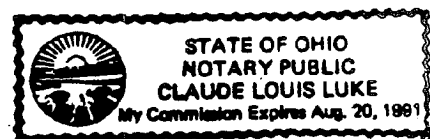
*Under the Albert & Mary and Wayne and Barbara Ogilbee properties.

David L. Bartsch 4-27-90
Signature of Affiant Date

Project Engineer
Position

Sworn before me and subscribed in my presence this
27th day of APRIL, 1990.

Claude Louis Luke
Notary Public



RIGHT OF ENTRY INFORMATION

C. (1)(b) Provide either of the following to allow for coal mining operations within the underground workings.

- (i) A copy of the documents, or
- (ii) An affidavit wherein the documents are described. For all documents or affidavits provided for the underground workings, the specific parcels are to be identified on the application map.

AFFIDAVIT

State of Ohio, Belmont County, ss. David L. Bartsch being first duly sworn, says that the following described documents convey to the applicant the legal right explained below and is a subject of litigation as shown below.

Type of document Warranty Deed

Execution Date December 29, 1970

Expiration Date --

Parties: From The North American Coal Corporation To The Nacco Mining Company

Description of land: No. Acres

County Belmont Township Smith

Sections 19 Lots

Parcel # 51-2

Explanation of legal rights claimed See Addendum
to Page 11, Part 1, C(1)(b), Item 4

Pending litigation X Yes,* No.

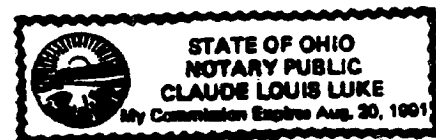
*Under the Albert and Mary Ogilbee property.

David L. Bartsch 4-27-90
Signature of Affiant Date

Project Engineer
Position

Sworn before me and subscribed in my presence this
27th day of APRIL, 1990.

Claude Louis Luke
Notary Public



RIGHT OF ENTRY INFORMATION

C. (1)(b) Provide either of the following to allow for coal mining operations within the underground workings.

- (i) A copy of the documents, or
- (ii) An affidavit wherein the documents are described. For all documents or affidavits provided for the underground workings, the specific parcels are to be identified on the application map.

AFFIDAVIT

State of Ohio, Belmont County, ss. David L. Bartsch being first duly sworn, says that the following described documents convey to the applicant the legal right explained below and is a subject of litigation as shown below.

Type of document Warranty Deed

Execution Date December 29, 1970

Expiration Date --

Parties: From The North American Coal Corporation To The Nacco Mining Company

Description of land: No. Acres

County Belmont Township Smith

Sections 20 Lots

Parcel # 47-1, 47-3

Explanation of legal rights claimed See Addendum
to Page 11, Part 1, C(1)(b), Item 5

Pending litigation X Yes,* No.

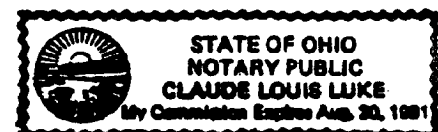
*47-1 only under the Grant property.

David L. Bartsch 4-27-90
Signature of Affiant Date

Project Engineer
Position

Sworn before me and subscribed in my presence this
27th day of APRIL, 19 90.

Claude Louis Luke
Notary Public



RIGHT OF ENTRY INFORMATION

C. (1)(b) Provide either of the following to allow for coal mining operations within the underground workings.

- (i) A copy of the documents, or
- (ii) An affidavit wherein the documents are described. For all documents or affidavits provided for the underground workings, the specific parcels are to be identified on the application map.

AFFIDAVIT

State of Ohio, Belmont County, ss. David L. Bartsch being first duly sworn, says that the following described documents convey to the applicant the legal right explained below and is a subject of litigation as shown below.

Type of document Warranty Deed

Execution Date December 29, 1970

Expiration Date --

Parties: From The North American Coal Corporation To The Nacco Mining Company

Description of land: No. Acres

County Belmont Township Smith

Sections 26 Lots

Parcel # 47-2

Explanation of legal rights claimed See Addendum
to Page 11, Part 1, C(1)(b) Item 6

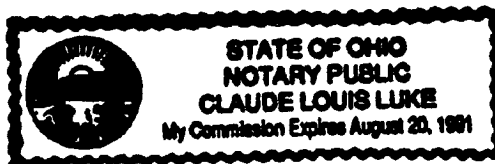
Pending litigation X Yes, * No.

Under the Richard and Vernice Otto property.

David L. Bartsch 2-3-90
Signature of Affiant Date

Project Engineer
Position

Sworn before me and subscribed in my presence this
3rd day of July, 1990.



Claude Louis Luke
Notary Public

RIGHT OF ENTRY INFORMATION

C. (1)(b) Provide either of the following to allow for coal mining operations within the underground workings.

- (i) A copy of the documents, or
- (ii) An affidavit wherein the documents are described. For all documents or affidavits provided for the underground workings, the specific parcels are to be identified on the application map.

AFFIDAVIT

State of Ohio, Belmont County, ss. David L. Bartsch being first duly sworn, says that the following described documents convey to the applicant the legal right explained below and is a subject of litigation as shown below.

Type of document Warranty Deed
Execution Date December 29, 1970
Expiration Date --
Parties: From The North American Coal Corporation To The Nacco Mining Company
Description of land: No. Acres _____
County Belmont Township Smith
Sections 19 Lots _____
Parcel # 47-4
Explanation of legal rights claimed See Addendum to Page 11, Part 1, C(1)(b), Item 8

Pending litigation X Yes,* _____ No.

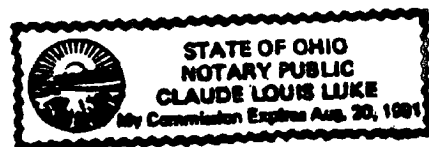
*Under the Richard and Vernice Otto property.

David L. Bartsch 4-27-90
Signature of Affiant Date

Project Engineer
Position

Sworn before me and subscribed in my presence this 27th day of APRIL, 19 90.

Claude Louis Luke
Notary Public



RIGHT OF ENTRY INFORMATION

C. (1)(b) Provide either of the following to allow for coal mining operations within the underground workings.

- (i) A copy of the documents, or
- (ii) An affidavit wherein the documents are described. For all documents or affidavits provided for the underground workings, the specific parcels are to be identified on the application map.

AFFIDAVIT

David L.
State of Ohio, Belmont County, ss. Bartsch being first duly sworn, says that the following described documents convey to the applicant the legal right explained below and is a subject of litigation as shown below.

Type of document Warranty Deed

Execution Date December 29, 1970

Expiration Date --

The North American
Parties: From Coal Corporation To The Nacco Mining Company

Description of land: No. Acres

County Belmont Township Smith

Sections 26 Lots

Parcel # 47-5, 47-6

Explanation of legal rights claimed See Addendum
to Page 11, Part 1, C(1)(b) , Item 7

Pending litigation X Yes, * No.

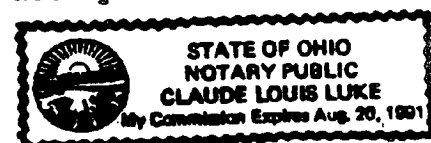
*Under the Richard and Vernice Otto property.

David L. Bartsch 4-27-90
Signature of Affiant Date

Project Engineer
Position

Sworn before me and subscribed in my presence this
27th day of APRIL, 19 90.

Claude Louis Luke
Notary Public



RIGHT OF ENTRY INFORMATION

C. (1)(b) Provide either of the following to allow for coal mining operations within the underground workings.

- (i) A copy of the documents, or
- (ii) An affidavit wherein the documents are described. For all documents or affidavits provided for the underground workings, the specific parcels are to be identified on the application map.

AFFIDAVIT

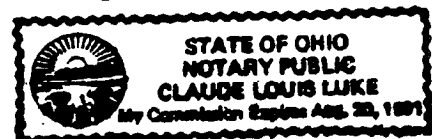
State of Ohio, Belmont County, ss. David L. Bartsch being first duly sworn, says that the following described documents convey to the applicant the legal right explained below and is a subject of litigation as shown below.

Type of document Warranty Deed
Execution Date December 29, 1970
Expiration Date --
Parties: From The North American Coal Corporation To The Nacco Mining Company
Description of land: No. Acres _____
County Belmont Township Smith
Sections 26 Lots _____
Parcel # 91-1, 91-2
Explanation of legal rights claimed See Addendum to Page 11, Part 1, C(1)(b), Item 12
Pending litigation Yes, ☒ No.

David L. Bartsch 4-27-90
Signature of Affiant Date
Project Engineer
Position

Sworn before me and subscribed in my presence this 27th day of APRIL, 1990.

Claude Louis Luke
Notary Public



RIGHT OF ENTRY INFORMATION

C. (1)(b) Provide either of the following to allow for coal mining operations within the underground workings.

- (i) A copy of the documents, or
- (ii) An affidavit wherein the documents are described. For all documents or affidavits provided for the underground workings, the specific parcels are to be identified on the application map.

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State of Ohio, Belmont County, ss. David L. Bartsch being first duly sworn, says that the following described documents convey to the applicant the legal right explained below and is a subject of litigation as shown below.

Type of document Warranty Deed

Execution Date December 29, 1970

Expiration Date --

Parties: From The North American Coal Corporation To The Nacco Mining Company

Description of land: No. Acres

County Belmont Township Smith

Sections 26 Lots

Parcel # 50-1,50-3

Explanation of legal rights claimed See Addendum to Page 11, Part 1, C(1)(b), Item 13

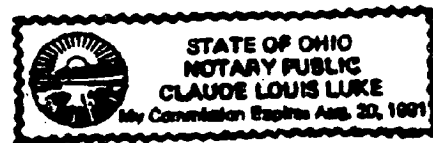
Pending litigation Yes, X No.

David L. Bartsch 4-27-90
Signature of Affiant Date

Project Engineer
Position

Sworn before me and subscribed in my presence this 27th day of April, 19 90.

Claude Louis Luke
Notary Public



RIGHT OF ENTRY INFORMATION

C. (1)(b) Provide either of the following to allow for coal mining operations within the underground workings.

- (i) A copy of the documents, or
- (ii) An affidavit wherein the documents are described. For all documents or affidavits provided for the underground workings, the specific parcels are to be identified on the application map.

AFFIDAVIT

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Type of document Warranty Deed

Execution Date December 29, 1970

Expiration Date --

Parties: From The North American Coal Corporation To The Nacco Mining Company

Description of land: No. Acres

County Belmont Township Smith

Sections 20 Lots

Parcel # 50-2

Explanation of legal rights claimed See Addendum to Page 11, Part 1, C(1)(b), Item 14

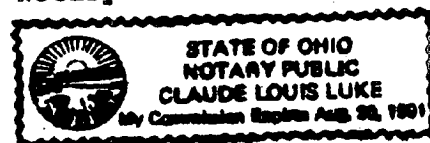
Pending litigation Yes, X No.

David L. Bartsch 4-27-90
Signature of Affiant Date

Project Engineer
Position

Sworn before me and subscribed in my presence this 27th day of April, 19 90.

Claude Louis Luke
Notary Public



RIGHT OF ENTRY INFORMATION

C. (1)(b) Provide either of the following to allow for coal mining operations within the underground workings.

- (i) A copy of the documents, or
- (ii) An affidavit wherein the documents are described. For all documents or affidavits provided for the underground workings, the specific parcels are to be identified on the application map.

AFFIDAVIT

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Type of document Warranty Deed

Execution Date December 29, 1970

Expiration Date --

Parties: From The North American Coal Corporation To The Nacco Mining Company

Description of land: No. Acres

County Belmont Township Smith

Sections 26 Lots

Parcel # 92

Explanation of legal rights claimed See Addendum to Page 11, Part 1, C(1)(b), Item 15

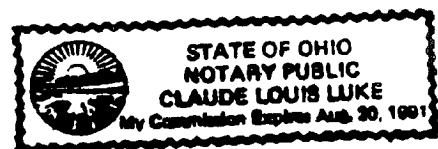
Pending litigation Yes, X No.

David L. Bartsch 4-27-90
Signature of Affiant Date

Project Engineer
Position

Sworn before me and subscribed in my presence this 27th day of APRIL, 19 90.

Claude Louis Luke
Notary Public



RIGHT OF ENTRY INFORMATION

C. (1)(b) Provide either of the following to allow for coal mining operations within the underground workings.

- (i) A copy of the documents, or
- (ii) An affidavit wherein the documents are described. For all documents or affidavits provided for the underground workings, the specific parcels are to be identified on the application map.

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Type of document Warranty Deed

Execution Date December 29, 1970

Expiration Date --

Parties: From The North American Coal Corporation To The Nacco Mining Company

Description of land: No. Acres

County Belmont Township Smith

Sections 20 Lots

Parcel # 53-1

Explanation of legal rights claimed See Addendum
to Page 11, Part 1, C(1)(b) Item 17

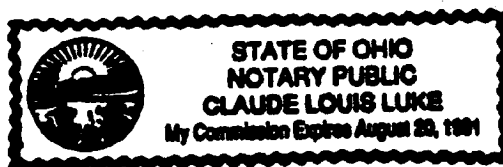
Pending litigation X Yes, No.

*Under the Betty L. Dunfee Property

David L. Bartsch 7-3-90
Signature of Affiant Date

Project Engineer
Position

Sworn before me and subscribed in my presence this
3RD day of JULY, 1990.



Claude Louis Luke
Notary Public

RIGHT OF ENTRY INFORMATION

C. (1)(b) Provide either of the following to allow for coal mining operations within the underground workings.

- (i) A copy of the documents, or
- (ii) An affidavit wherein the documents are described. For all documents or affidavits provided for the underground workings, the specific parcels are to be identified on the application map.

AFFIDAVIT

State of Ohio, Belmont County, ss. David L. Bartsch being first duly sworn, says that the following described documents convey to the applicant the legal right explained below and is a subject of litigation as shown below.

Type of document Warranty Deed

Execution Date December 29, 1970

Expiration Date --

Parties: From The North American Coal Corporation To The Nacco Mining Company

Description of land: No. Acres

County Belmont Township Smith

Sections 26 Lots

Parcel # 54 54-1

Explanation of legal rights claimed See Addendum
to Page 11, Part 1, C(1)(b) , Item 16

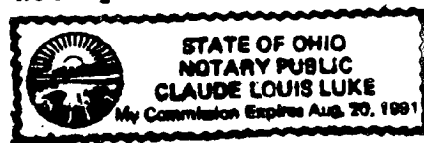
Pending litigation Yes, X No.

David L. Bartsch 4-27-90
Signature of Affiant Date

Project Engineer
Position

Sworn before me and subscribed in my presence this
27th day of April, 1970.

Claude Louis Luke
Notary Public



ADDENDUM TO PAGE 11, PART 1, C(1)(b)
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
PERMIT D-0360

The transfer of the stock of The NACCO Mining Company to The Ohio Valley Coal Company was described and approved in ARP R-0360-3.

ADDENDUM TO PAGE 11, PART 1, C(1)(b)
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
PERMIT D-0360

Item 1: Deed Rights to Tract 86

Together with the free and uninterrupted right of way into, upon and under said lands at such points and in such manner as may be proper and necessary for the purpose of digging, mining, and carrying away said coal, hereby waiving all damages arising therefrom, or from the removal of said coal; together with the privilege of mining, and removing through said described premises other coal belonging to Grantee, his heirs or assigns, or which may hereafter be acquired.

Item 2: Deed Rights to Tract 87

Together with the free and uninterrupted right of way into, upon and under said lands at such points and in such manner as may be proper and necessary for the purpose of digging, mining, and carrying away said coal, hereby waiving all damages arising therefrom, or from the removal of all of said coal; together with the privilege of mining and removing through said described premises other coal belonging to said Grantee, his heirs or assigns, or which may hereafter be acquired.

Item 3: Deed Rights to Tract 51-1

Together with the free and uninterrupted right of way into, upon and under said lands at such points and in such manner as may be proper and necessary for the purpose of digging, mining, and carrying away said coal, hereby waiving all damages arising therefrom, or from the removal of all of said coal; together with the privilege of mining and removing through said described premises other coal belonging to said Grantee, his heirs or assigns, or which may be acquired.

Item 4: Deed Rights to Tract 51-2

Together with the free and uninterrupted right of way into, upon and under said lands at such points and in such manner as may be proper and necessary for the purpose of digging, mining, and carrying away said coal, hereby waiving all damages arising therefrom, or from the removal of all of said coal; together with the privilege of mining and removing through said described premises other coal belonging to said Grantee, his heirs or assigns, or which may be acquired.

Item 5: Deed Rights to Tracts 47-1 and 47-3

Mining Rights: Party of Second part to have the free and uninterrupted right of way into and under said land, at such points and in such manner as may be proper and necessary for the purpose of digging, mining, draining, and ventilating and carrying away said coal, (hereby waiving all surface damages, or damages of any sort, arising therefrom, or from the removal of all of said coal), together with the privilege of mining and removing through said described premises, other coal belonging to said party of the second part, its successors and assigns, or which may hereafter be acquired.

Item 6: Deed Rights to Tract 47-2

Mining Rights: Party of Second part to have the free and uninterrupted right of way into and under said land, at such points and in such manner as may be proper and necessary for the purpose of digging, mining, draining, and ventilating and carrying away said coal, (hereby waiving all surface damages, or damages of any sort, arising therefrom, or from the removal of all of said coal), together with the privilege of mining and removing through said described premises, other coal belonging to said party of the second part, its successors and assigns, or which may hereafter be acquired.

Item 7: Deed Rights to Tracts 47-5 and 47-6

Mining Rights: Party of Second part to have the free and uninterrupted right of way into and under said land, at such points and in such manner as may be proper and necessary for the purpose of digging, mining, draining, and ventilating and carrying away said coal, (hereby waiving all surface damages, or damages of any sort, arising therefrom, or from the removal of all of said coal), together with the privilege of mining and removing through said described premises, other coal belonging to said party of the second part, its successors and assigns, or which may hereafter be acquired.

Item 8: Deed Rights to Tract 47-4

Mining Rights: Party of Second part to have the free and uninterrupted right of way into and under said land, at such points and in such manner as may be proper and necessary for the purpose of digging, mining, draining, and ventilating and carrying away said coal, (hereby waiving all surface damages, or damages of any sort, arising therefrom, or from the removal of all of said coal), together with the privilege of mining and removing through said described premises, other coal belonging to said party of the second part, its successors and assigns, or which may hereafter be acquired.

Item 9: Deed Rights to Tracts 48-1, 48-2, and 48-3

Mining Rights: Party of Second part to have the free and uninterrupted right of way into and under said land, at such points and in such manner as may be proper and necessary for the purpose of digging, mining, draining, and ventilating and carrying away said coal, (hereby waiving all surface damages, or damages of any sort, arising therefrom, or from the removal of all of said coal), together with the privilege of mining and removing through said described premises, other coal belonging to said party of the second part, its successors and assigns, or which may hereafter be acquired.

Item 10: Deed Rights to Tract 90

Together with the free and uninterrupted right of way into and under said lands at such points and in such manner as may be proper and necessary for the purpose of digging, mining, and carrying away all of said coal, hereby waiving all damages arising therefrom, or from the removal of said coal, together with the privilege of mining and removing through said vein of coal and entries made in mining the same, other coal belonging to said Grantee, his heirs or assigns, or which may hereafter be acquired.

Item 11: Deed Rights to Tract 89

Together with the free and uninterrupted right of way into, upon and under said lands at such points and in such manner as may be proper and necessary for the purpose of digging, mining, and carrying away said coal, hereby waiving all damages arising therefrom, or from the removal of all of said coal; together with the privilege of mining and removing through said described premises other coal belonging to said Grantee, his heirs or assigns, or which may be acquired.

Item 12: Deed Rights to Tracts 91-1 and 91-2

Mining Rights: Party of Second part to have the free and uninterrupted right of way into and under said land, at such points and in such manner as may be proper and necessary for the purpose of digging, mining, draining, and ventilating and carrying away said coal, (hereby waiving all surface damages, or damages of any sort, arising therefrom, or from the removal of all of said coal). It is further agreed that the party of second part shall be liable for any surface damage done through mining the above coal, (the same in option), together with the privilege of mining and removing through said described coal premises, other coal belonging to said party of the second part, its successors and assigns, or which may hereafter be acquired.

Item 13: Deed Rights to Tracts 50-1 and 50-3

Mining Rights: Party of Second part to have the free and uninterrupted right of way into, upon and under said land, at such points and in such manner as may be proper and necessary for the purpose of digging, mining, draining, and ventilating and carrying away said coal, together with the privilege of mining and removing through said described premises, other coal belonging to said party of the second part, its successors, heirs and assigns, or which may hereafter be acquired.

Item 14: Deed Rights to Tract 50-2

Mining Rights: Party of Second part to have the free and uninterrupted right of way into, upon and under said land, at such points and in such manner as may be proper and necessary for the purpose of digging, mining, draining, and ventilating and carrying away said coal, together with the privilege of mining and removing through said described premises, other coal belonging to said party of the second part, its successors, heirs and assigns, or which may hereafter be acquired.

Item 15: Deed Rights to Tract 92

Mining Rights: Party of Second part to have the free and uninterrupted right of way into and under said land, at such points and in such manner as may be proper and necessary for the purpose of digging, mining, draining, and ventilating and carrying away said coal, (hereby waiving all surface damages, or damages of any sort, arising therefrom, or from the removal of all of said coal), together with the privilege of mining and removing through said coal described premises, other coal belonging to said party of the second part, its successors and assigns, or which may hereafter be acquired.

Item 16: Deed Rights to Tracts 54 and 54-1

Mining Rights: Party of Second part to have the free and uninterrupted right of way under and into said land, at such points and in such manner as may be proper and necessary for the purpose of digging, mining, draining, and ventilating and carrying away said coal, (hereby waiving all surface damages, or damages of any sort, arising therefrom, or from the removal of all of said coal), together with the privilege of mining and removing through under and through said described premises, other coal belonging to said party of the second part, its successors and assigns, or which may hereafter be acquired.

ADDENDUM TO PAGE 11, PART 1, C(1)(b)
PAGE FIVE

Item 17: Deed Rights to Tract 53-1

Mining Rights: Party of Second part to have the free and uninterrupted right of way into, and under said land, at such points, and in such manner as may be proper and necessary for the purpose of digging, mining, draining and ventilating, and carrying away said coal, (hereby waiving all surface damages, or damages of any sort, arising therefrom, or from the removal of all of said coal), together with the privilege of mining and removing through said described premises, other coal belonging to said party of the second part, its successors and assigns, or which may hereafter be acquired.

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[illegible]

D. AREAS WHERE MINING IS PROHIBITED OR LIMITED-Permit Area

- (1) Does the permit area included in this permit application include any area dedicated as a nature preserve pursuant to Chapter 1517., Ohio Revised Code? Yes, No. If "yes," submit proof of valid existing right.

Not Applicable - No Permit Area

- (2) Does the permit area included in this permit application include any area within one-thousand feet of the waterlines of any wild, scenic, or recreational river dedicated pursuant to Chapter 1501., Ohio Revised Code? Yes, No. If "yes," submit proof of valid existing right.

Not Applicable - No Permit Area

- (3) Does the permit area included in this permit application include any area within the boundaries of the following systems: national park, national wildlife refuge, national trails, national wilderness preservation, national recreational areas, or wild and scenic rivers or river corridors, including those rivers under study? Yes, No. If "yes," submit proof of valid existing right.

Not Applicable - No Permit Area

- (4) Does the permit area included in this permit application include any federal lands within the boundaries of any national forest? Yes, No. If "yes," submit approval of the U.S. Secretary of Interior of proof of valid existing right.

Not Applicable - No Permit Area

- (5) Will operations in the permit area conducted under this permit adversely affected any publicly owned park or places listed on the National Register of Historic Places? Yes, No. If "yes," submit joint approval from the chief and the federal, state, or local agency with jurisdiction over the park or historic property or proof of valid existing right.

Not Applicable - No Permit Area

- (6) Will operations in the permit area conducted under this permit affect land within one hundred feet of the outside right-of-way of a public highway? Yes, No. If "yes," list the highways in the space below and submit Attachment 9 or proof of valid existing right.

Not Applicable - No Permit Area

- D. (7) Will operations in the permit area conducted under this permit affect land within three hundred feet of any occupied dwelling? Yes, No. If "yes," list the name of the owner(s) in the space below and submit Attachment 10 or proof of valid existing right.

Not Applicable - No Permit Area

- (8) Will operations in the permit area conducted under this permit, affect land within three hundred feet of any public building, school, church, community or institutional building, or public park?
 Yes, No. If "yes," submit proof of valid existing right.

Not Applicable - No Permit Area

- (9) Will operations in the permit area conducted under this permit, affect land within one hundred feet of a cemetery? Yes, No. If "yes," submit proof of valid existing right or appropriate authorization to relocate the cemetery.

Not Applicable - No Permit Area

- (10) Will operations conducted during this permit result in the extension of any part of the pit within fifty feet of horizontal distance to any adjacent land or water in which the applicant does not own either the surface or mineral rights? Yes, No. If "yes," list below the names of the adjacent owners and submit Attachment 11.

Not Applicable - No Permit Area

E. Areas Where Mining is Prohibited or Limited-Permit and Shadow Area

Are there areas within the proposed permit area, shadow area, or adjacent areas designated unsuitable for coal mining operations under rule 1501:13-3-07 of the Administrative Code or under study for designation in an administrative proceeding under this rule?

 Yes, X No.

- (1) If "yes" to the item above, did the applicant make substantial legal and financial commitments in the proposed areas prior to January 4, 1977?
 Yes, No.
- (2) If "yes" to item (1) above, submit as an addendum to the permit application information supporting the assertions that the commitments were made prior to January 4, 1977.

F. PERMIT TERM AND EXTENT-Permit and Underground Workings

- (1) Anticipated/actual date for:
- (a) Starting mining operations 1990
- (b) Terminating mining operations 1992
- (2) Does the applicant propose a permit term in excess of five (5) years? Yes, X No. If "yes," submit an addendum with the information required by 1501:13-4-03(E) (3).
- (3) Indicate the following acreage figures:
- (a) Total Acres _____ (Permit area)
- (b) Total Acres 691 (Underground Workings)
- (4) Horizontal extent of underground workings over life of permit in acres:
- (a) Full Coal Recovery 691
- (b) Room and Pillar _____

G. PUBLIC NOTICE-Permit and Shadow Area

- (1) In the space below, provide the name and address of the public office where a complete copy of this permit application is to be filed.

Division of Reclamation
70245 Bannock-Uniontown Road
St. Clairsville, OH 43950

- (2) In the space below, list the name and address of the newspaper and submit an addendum providing the text of the advertisement that is to be published in a newspaper of general circulation in the locality of the proposed operation. Note: The advertisement is to provide the information required by paragraph (A) of rule 1501:13-5-01 of the Administrative Code.

The Times Leader
200 S. 4th Street
Martins Ferry, Ohio 43935

PROOF OF PUBLICATION

The State of Ohio
County of Belmont, ss:

The undersigned, being sworn, says that he or she is an employee of Eastern Ohio Newspapers, Inc., A Corporation, publisher of the Times Leader a newspaper published in Martins Ferry, Belmont County, Ohio, each day of the week except Saturday and of general circulation in said city and county; that it is a newspaper meeting the requirements of sections 7.12 and 5721.01 Ohio Revised Code as amended effective September 14, 1957; that affiant has custody of the records and files of said newspaper; and that the advertisement of which the annexed is a true copy, was published in said newspaper on each of the days in the month and year stated, as follows:

Aug 1, 8, 15 & 22
19 90
Nancy M. Swords

Subscribed by Affiant and sworn

to before me, this 22 day of

Aug, A.D. 19 90

Donna Jean Landers
Notary Public

DONNA JEAN LANDERS, Notary Public

State of Ohio

My Commission Expires February 7, 1995

Printer's Fees \$ 50.00
Notary's Fees \$

THE TIMES LEADER
Martins Ferry, Ohio
Bellaire, Ohio

PUBLIC NOTICE

The Ohio Valley Coal Company, 56854 Pleasant Ridge Road, Alledonia, Ohio 43902, has submitted an underground coal mining application designated as D-0360-1 to the Ohio Department of Natural Resources, Division of Reclamation. The proposed additional underground acreage for Permit D-0360 is located in Belmont County, Smith Township, Sections 19, 20, 25 and 26. The area is located on the Armstrong Mills 7-1/2 minute USGS quadrangle map, approximately 1/4 mile south of Centerville, Ohio. The proposed underground workings encompass 691 acres. Coal in this underground area will be removed using full coal recovery methods.

This application is on file at the Division of Reclamation Office at 70245 Bannock-Uniortown Road, St. Clairsville, Ohio 43950, for public viewing. Written comments or requests for an informal conference may be sent to the Division of Reclamation, Fountain Square, Building H-3, Columbus, Ohio 43224, within thirty days of the last date of publication of this notice.

T-Adv. Aug. 1 - 4 Wed.

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PART 2 ENVIRONMENTAL RESOURCES INFORMATION

A. CULTURAL, HISTORIC, AND ARCHEOLOGICAL INFORMATION-Permit and Planned Subsidence Area

- (1) Are there any cultural or historic resources or structures listed or eligible for listing on the National Register of Historic Places within the proposed permit or planned subsidence area?
X Yes, No. If "yes," describe the resources and structures including the location. In addition, submit Attachment 27 or 27A as appropriate.

See Attachment 27A. The structures at the Otto farmstead will be undermined during the late third quarter or early fourth quarter of 1991. Prior to undermining or surface subsidence, any additional, necessary information will be submitted to the Division.

- (2) Are there any known archeological sites within the proposed permit or planned subsidence area?
 Yes, X No. If "yes," describe the site including the location. In addition, submit Attachment 27 or 27A as appropriate.

- (3) If applicable, based upon the review of the proposed planned subsidence areas and the completed Attachment 27A for the initial six months of projected mining, have any properties listed or eligible for listing on the National Register of Historic Places been identified? Yes, X No. If "yes," list each property identified.

- (4) Submit an addendum indicating the method to be used to identify historic properties on planned subsidence areas as mining progresses.

See Addendum to Page 17, Part 2, A(4)

B. GEOLOGY DESCRIPTION-Permit and Shadow Area

- (1) Submit an addendum describing the geology within the proposed permit area and shadow area down to and including the first stratum below the lowest coal seam to be mined or any aquifer below the lowest coal seam to be mined which may be adversely affected by mining. The description shall also include information on the areal and structural geology of the permit and shadow area and any other geologic parameters which may influence the probable hydrologic consequences and protection of the hydrologic balance from material damage outside of the permit area.

See Addendum to Page 17, Part 2, B

**OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION
Planned Subsidence Areas - Underground Mining Operations**

**ATTACHMENT 27A
(HISTORIC AND PREHISTORIC PROPERTIES)**

1. Applicant's Name The Ohio Valley Coal Company Permit # D-0360
Address 56854 Pleasant Ridge Road
City Alliedonia State Ohio Zip 43902
2. Contact Person David L. Bartsch Phone 614-926-1351
3. Location and Acreage Information
County Belmont Township Smith
Section(s)/Lots 19, 20, 25, 26 T- 6 , R- 4
USGS Quadrangle Armstrong Mills Acreage 691 366 ac. first year
4. Full Coal Recovery Area Map Attached: (USGS Quadrangle with full coal recovery area delineated)
5. Historic and Prehistoric Structures:

Definitions

A historic or prehistoric structure is a work made up on interdependent and interrelated parts in a definite pattern of organization. Constructed by humans, and 50 years or older, it is usually an engineering project.

Types

Historic structures include, but are not limited to dwellings, buildings, barns, farmstead outbuildings, bridges, culverts, churches, schools, halls, iron furnaces (and associated buildings), canals, forts, abandoned coal mine buildings, mine entrances, tipples and related structures, etc.

Prehistoric structures include, but are not limited to, earthworks and mounds.

List all known historic and prehistoric structures below and locate each one on the map to be sent to the SHPO including corresponding labeled black and white, front and rear photographs of each structure. Attach addendum, if necessary.

Structure Type	Construction Date	Map Reference	Photo# Front	Photo# Rear
Brick Farm House	1865-1870	7		
Foundation	Pre 1940	8		
Ruins of log Structure	Pre 1940	9		

6. Previous Historic and/or Archeological Surveys: (describe any surveys known to applicant on the planned subsidence areas)

7. SHPO please send this form to:

Dr. Jeffrey C. Reichwein
Division of Reclamation
Fountain Square, Building B-3
Columbus, Ohio 43224

FOR USE BY THE STATE HISTORIC PRESERVATION OFFICE ONLY

(check appropriate spaces)

A. ☐ This is a recommendation for an archeological survey of the proposed full coal recovery area based on the following reasons (attached addendum, if necessary):

A SHPO review of the area shown on the map has provided a listing below of all known historic and prehistoric properties listed and eligible for listing on the "National Register of Historic Places" and known historic and prehistoric sites on the permit and adjacent areas (in a 1.5 mile radius). The listing includes, when appropriate, those historic and prehistoric structures identified by the applicant in items 5. and 6. above.

Listed and Eligible National Register Sites

Site Name (#)	Type	Proposed Area	Adjacent Area

Known Historic and Prehistoric Sites

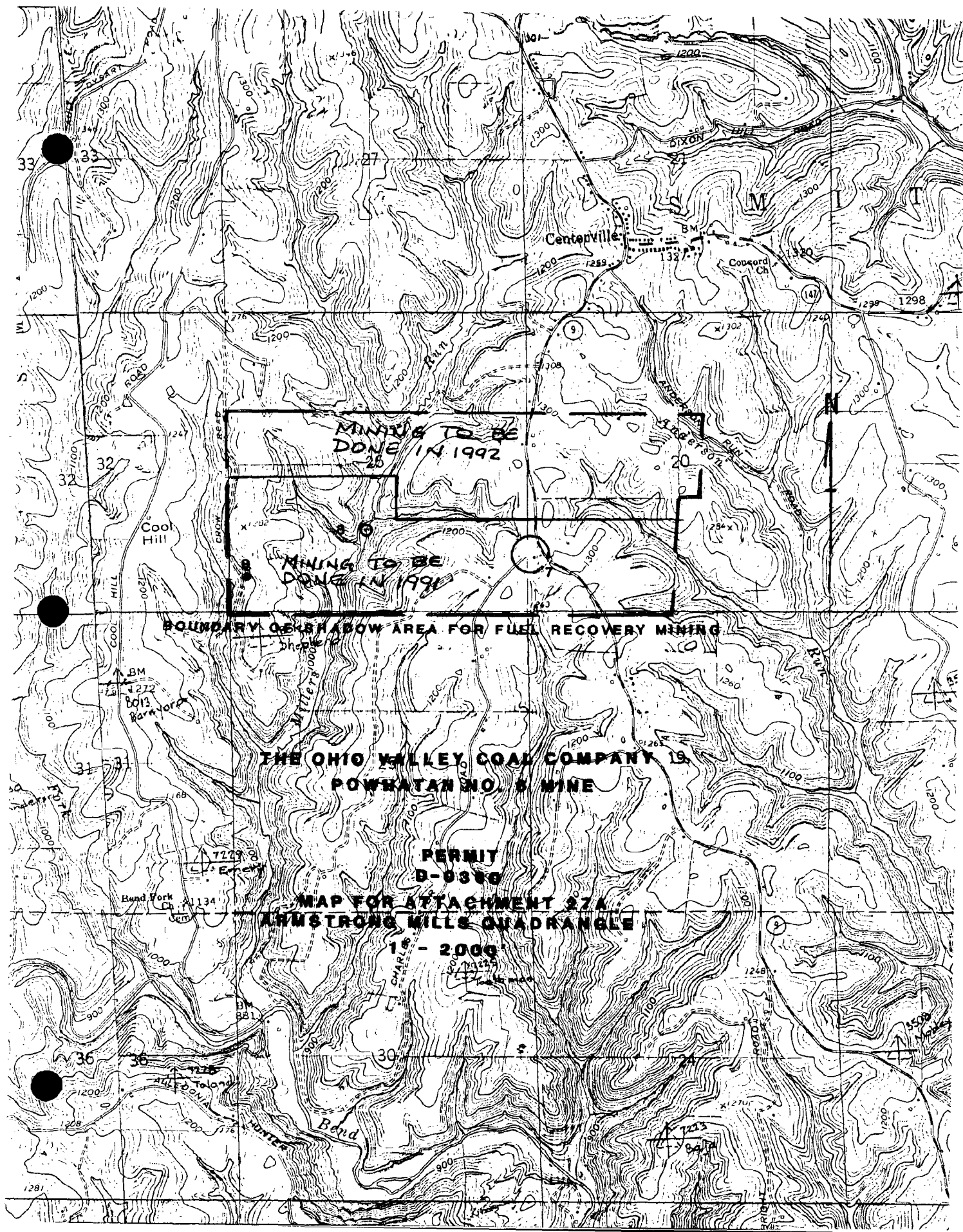
Site Name (#)	Type	Proposed Area	Adjacent Area

B. _____ A SHPO review of the area shown on the application map and information contained in this attachment finds that the proposed mining does not have a reasonable probability of affecting any properties listed or eligible for listing on the "National Register of Historic Places." Therefore, no further coordination will be necessary with this office unless the scope of the proposed application area changes.

State Historic Preservation Officer _____

SHPO # _____

Date _____



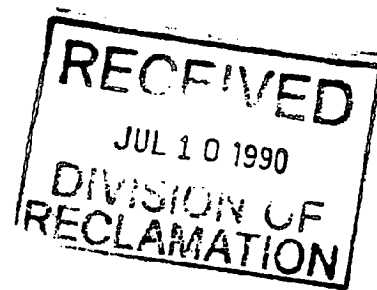
ADDENDUM TO PAGE 17, PART 2, A(4)
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
PERMIT D-0360

IDENTIFICATION OF HISTORIC PROPERTIES

Included in this permit revision is Attachment 27A which identifies the properties/structures which may be eligible for listing on the National Register for Historic Places. As mining progresses, the required report and photographs of each structure will be submitted no less than 6 months prior to the undermining of the structures with full recovery mining. The identification of these properties/structures will comply with PPD Underground 89-3.



July 9, 1990



Mr. Tim Dieringer, Chief
Division of Reclamation
Ohio Department of Natural Resources
Fountain Square - Building H-3
Columbus, Ohio 43224

Attn: Ms. Vanessa Tolliver

Dear Ms. Tolliver:

The Ohio Valley Coal Company respectfully requests a variance from the requirements of OAC #1501:13-4-13(c)(2)(d)(ii) to (iv) for test holes N84-3 and N86-14. An application for a permit to mine coal using the longwall method of mining will be submitted to ODNR in the near future. I am enclosing the following for your information:

1. Chemical analyses of the roof and floor rock and of the coal from test areas within the Powhatan No. 6 Mine. These results are already a part of Permit D-0360. I am also enclosing core logs and Attachment 13's (including analyses) for three adjacent test holes that were drilled recently.
2. Map OV-LW-90-2 showing the shadow area, the location of the test holes, and structural contours to be mined. This map will be a part of the permit application to be submitted.
3. An addendum that describes the engineering characteristics of the immediate roof, floor, and coal to be mined.
4. Geologic and hydrologic cross sections between the test holes.

~~If you have any questions, please contact me.~~

APPROVED <input checked="" type="checkbox"/>
DISAPPROVED <input type="checkbox"/>
DATE <u>7-20-90</u>
SIGNED <u>Tim L. Dieringer</u>
<u>M. Nakamura</u>

Very truly yours,

THE OHIO VALLEY COAL COMPANY

David L. Bartsch

David L. Bartsch, P.E.
Project Engineer

DLB:pm

Enclosures

56854 PLEASANT RIDGE ROAD • ALLEDONIA OHIO 43902 • (614) 926-1351

TOVCC 15141

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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole # N84-3

*Coordinates: x. 2428500 y. 718300 Surface Elevation 1262 ft

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	—	20.0'	—
Subsoil	—	—	—
Shale	—	4.0'	CM, EM
Claystone	—	2.4'	CV, EV
Sandstone	—	4.5'	CS, ES
Shale	—	1.8'	CM, EM
Shale	—	0.9'	CM, EM
Limestone	—	11.5'	AK, CS, ES
Shale	—	8.3'	CM, EM
Shale	—	9.0'	CM, EM
Limestone	—	4.6'	AK, CS, ES

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

E = Erodible (V=Very, M=Moderate, S=Slight)

3/90

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole # N84-3

*Coordinates: X 2428500 Y. 718300 Surface Elevation 1262 ft

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	_____	_____	_____
Subsoil	_____	_____	_____
Claystone	_____	7.7'	CV, EV
Shale	_____	12.3'	CM, EM
Claystone	_____	12.0'	CV, EV
Shale	_____	4.7'	CM, EM
Claystone	_____	17.0'	CV, EV
Sandstone	_____	6.6'	CS, ES
Shale	_____	11.5'	CM, EM
Limestone	_____	5.2'	AK, CS, ES
Claystone	_____	6.5'	CV, EV

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

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C = Compactible (V=Very, M=Moderate, S=Slight)

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3/90

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole #N84-3

*Coordinates: X. 2428500 Y. 718300 Surface Elevation 1262 ft

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	_____	_____	_____
Subsoil	_____	_____	_____
Shale	_____	5.3'	CM, EM
Shale	_____	12.9'	CM, EM
Bone	_____	0.2'	_____
Claystone	_____	5.8'	CV, EV
Sandstone	_____	6.0'	CS, ES
Claystone	_____	7.5'	CV, EV
Bone	_____	0.2'	_____
Coal	_____	2.0'	AC, ES, ES
Claystone	_____	0.5'	CV, EV

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

E = Erodible (V=Very, M=Moderate, S=Slight)

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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole # N84-3

*Coordinates: X 2428500 Y 718300 Surface Elevation 1262 ft

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	—	—	—
Subsoil	—	—	—
Coal	—	0.3'	AC, CS, ES
Shale	—	4.0'	CM, EM
Sandstone	—	9.8'	CS, ES
Shale	—	0.5'	CM, EM
Claystone	—	17.5'	CV, EV
Sandstone	—	5.5'	CS, ES
Claystone	—	19.8'	CV, EV
Shale	—	0.8'	CM, EM
Claystone	—	14.9'	CV, EV

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

E = Erodible (V=Very, M=Moderate, S=Slight)

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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole # N84-3
*Coordinates: X 2428500 Y. 718300 Surface Elevation 1262 ft

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	—	—	—
Subsoil	—	—	—
Shale	—	22.0'	CM, EM
Claystone	—	3.5'	CV, EV
Shale	—	8.5'	CM, EM
Coal	—	1.2'	AC, CS, ES
Shale	—	8.8'	CM, EM
Coal	—	0.2'	AC, CS, ES
Claystone	—	14.8'	CV, EV
Shale	—	19.5'	CM, EM
Coal	—	2.75'	AC, CS, ES

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

E = Erodible (V=Very, M=Moderate, S=Slight)

3/90

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole #N84-3

*Coordinates: X. 2428500 Y. 718300 Surface Elevation 1262 ft

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	_____	_____	_____
Subsoil	_____	_____	_____
Claystone	_____	1.75'	CV, EV
Shale	_____	8.0'	CM, EM
Claystone	_____	7.5'	CV, EV
Sandstone	_____	3.1'	CS, ES
Shale	_____	4.6'	CM, EM
Limestone	_____	2.8'	AK, CS, ES
Claystone	_____	12.6'	CV, EV
Limestone	_____	2.4'	AK, CS, ES
Claystone	_____	23.3'	CV, EV

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

E = Erodible (V=Very, M=Moderate, S=Slight)

3/90

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole # N84-3

*Coordinates: X. 2428500 Y. 718300 Surface Elevation 1262 ft

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	—	—	—
Subsoil	—	—	—
Limestone	—	14.1'	AK, CS, ES
Claystone	—	3.9'	CV, EV
Limestone	—	8.0'	AK, CS, ES
Shale	—	10.5'	CM, EM
Limestone	—	4.4'	AK, CS, ES
Claystone	—	6.1'	CV, EV
Coal	—	3.92'	AC, CS, ES
Shale	—	2.88'	CM, EM
Shale	—	21.6'	CM, EM

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

E = Erodible (V=Very, M=Moderate, S=Slight)

3/90

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole # N84-3

*Coordinates: X. 2428500 Y. 718300 Surface Elevation 1262 ft

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	---	---	---
Subsoil	---	---	---
Limestone	---	23.5'	AK, CS, ES
Claystone	---	3.7'	CV, EV
Limestone	---	2.2'	AK, CS, ES
Claystone	---	8.3'	CV, EV
Limestone	---	14.0'	AK, CS, ES
Claystone	---	6.25'	CV, EV
Coal	---	6.23'	AC, CS, ES
Shale	---	1.02'	CM, EM
Limestone	---	1.1'	AK, CS, ES

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
---	---	---	---	---	---
---	---	---	---	---	---
---	---	---	---	---	---

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

E = Erodible (V=Very, M=Moderate, S=Slight)

3/90

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole #N84-3

*Coordinates: X. 2428500 Y. 718300 Surface Elevation 1262 ft

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	_____	_____	_____
Subsoil	_____	_____	_____
Shale	_____	10.0'	CM, EM
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

E = Erodible (V=Very, M=Moderate, S=Slight)

DIAMOND DRILL HOLE: N84-3
 Geologist: Eileen Hertel
 Elevation: 1261.56 ft.
 Coordinates: S 22,786.08 W 65,608.51

Driller: Hughes Drilling Co., Dale Jarvis

Surface Owner: Richard Otto
 Coal Tract:
 Township: Smith, Section 26, SEk
 County: Belmont

Date Started: September 20, 1984
 Date Completed: September 26, 1984

o Logged by W. J. Siplivy 235'-570'

Strata Thickness (Ft.)	Depth From Surface (Ft.)
---------------------------	-----------------------------

20.0	20.0
7.0	27.0
4.0	31.0
2.4	33.4
4.5	37.9
1.8	39.7
0.9	40.6
11.5	52.1
8.3	60.4
9.0	69.4
4.6	74.0
7.7	81.7
12.3	94.0
12.0	106.0
4.7	110.7
17.0	127.7
6.6	134.3
11.5	145.8
5.2	151.0
6.5	157.5
5.3	162.8
12.9	175.7
0.2	175.9
5.8	181.7
6.0	187.7
7.5	195.2
0.2	195.4
2.0	197.4
0.5	197.9
0.3	198.2
4.0	202.2
9.8	212.0
0.5	212.5
17.5	230.0
5.5	235.5
19.8	255.3
0.8	256.1
14.9	271.0
22.0	293.0
3.5	296.5
8.5	305.0
1.2	306.2
8.8	315.0
0.2	315.2
14.8	330.0
19.5	349.5
2.75	352.25

Strata

Non-coring.
 Core loss.
 Shale, brown, ironstained, broken.
 Claystone, med. gray, v. soft, sks.
 Sandstone, shale streaks, fine-med. grained.
 med. gray, sl. ironstained.
 Shale, med. gray, limey.
 Shale, black, limey.
 Limestone, med. gray, grades arg.
 Sandy shale, massive, med. gray, limey, occ.
 sandstone streaks and beds.
 Shale, med. gray, arg., dark near base.
 Limestone, med. gray, occ. arg.
 Claystone, med. gray w/some red, v. limey.
 v. soft sks.
 Shale, green w/some red, arg.
 Claystone, med. gray, v. limey, med. soft.
 occ. sks.
 Shale, sl. sandy, med. gray, sl. limey.
 Claystone, sandy, limey, med. gray, med. hard.
 Sandstone, shale streaks, med. grained, lt.
 gray, calcite cement, mica.
 Shale, med. gray, arg., sandy near top.
 Limestone, med. gray, arg.
 Claystone, med. gray, limey, soft, sks.
 Shale, gray & red arg.
 Shale, med. gray, arg. near base.
 Bone.
 Claystone, med. gray, v. limey, occ. sks.
 Sandstone & shale, interbedded, med. gray.
 sl. limey.
 Claystone, dk. gray to black, med. soft, sks.
 Bone, pyrite.
 WASHINGTON COAL (No. 12)
 Clarain, dull, bright bands
 Claystone, black, pyritic.
 Coal, bright.
 Shale, black, abundant coal streaks, arg.
 near top.
 Sandstone, shale and carb. streaks abundant.
 med. grained, med. gray, mica.
 Shale, dk. gray.
 Claystone, med. gray, v. limey, occ. sks.
 Sandstone, l. gray, shaly.
 Claystone, green-gray w/red
 Shale, black, carbonaceous.
 Claystone, green-gray.
 Shale, med. gray.
 Claystone, med. gray, carb. bottom 6".
 Shale, med. gray.
 Coal, WAYNESBURG (No. 11)
 Shale, m. gray w/ occ. sks.
 Coal.
 Claystone, gray-green w/occ. calc. nod.
 Shale, m. gray w/occ. ss interbedded.
 Coal, UNIONTOWN (No. 10)
 1.88 Coal
 0.46 Shale w/coal partings
 0.41 coal
 2.75 Total thickness

Strata Thickness (Ft.)	Depth From Surface (Ft.)
---------------------------	-----------------------------

1.75	354.0
8.0	362.0
7.5	369.5
3.1	372.6
4.6	377.2
2.8	380.0
12.6	392.6
2.4	395.0
23.3	418.3
14.1	432.4
3.9	436.3
8.0	444.3
10.5	454.8
4.4	459.2
6.1	465.3
3.92	469.22

2.88	472.1
21.6	493.7
23.5	517.2
3.7	520.9
2.2	523.1
8.3	531.4
14.0	545.4
6.25	551.65
6.23	557.88

1.02	558.9
1.1	560.0
10.0	570.0

Strata

Claystone, med. gray.
Shale, med. gray w/occ. ss.
Claystone, med. gray w/LS interbedded.
Sandstone, l. gray, calc. cement.
Shale, med. gray.
Limestone, l. gray.
Claystone, l. gray w/LS interbedded.
Limestone, l. gray.
Claystone, gray-green w/LS interbedded.
Limestone, l. gray, nod. upper 7'.
Claystone, gray-green w/LS interbedded.
Limestone, l. gray w/occ. shale partings.
Shale, med. gray.
Limestone, l. gray.
Claystone, dk. gray.
Coal, SEWICKLEY (No. 9)
2.08 Coal
.33 Shale, carb.
1.51 Coal
3.92 Total thickness
Shale, dk. gray.
Shale, med. gray w LS interbedded bot. 5'.
Limestone, l. gray w/claystone partings.
Claystone, med. gray.
Limestone, l. gray.
Claystone, med. gray, clayey, upper 2'.
Limestone, l. gray, nod. lower 3'.
Claystone, med. gray.
PITTSBURGH (No. 8) COAL
0.38 Roof Coal
1.10 Shale, Dk. gray
4.75 Coal, Main Bench
6.23 Total
Shale, dk. gray, firm.
Limestone, med. gray.
Shale, med. gray.

- d. Engineering properties and thicknesses of clays and soft rocks in the stratum immediately above and below the coal seam -- immediately above and below the Pittsburgh Seam are layers of fire-clay. Above the seam, the clay stone (4000 psi compressive strength) is 5 to 10 ft thick. This clay is often slicken-sided and weathers rapidly when exposed. However, when mining occurs, a small layer of roof coal is left in place to protect against weathering. Although this rock forms the immediate roof, above this is the Redstone Limestone -- a 12 to 17 ft thick member that forms the main roof. Generally, this member protects the surface from subsidence damage even when the clay stone members below are removed.

The bottom rock (5000 psi compressive strength) is composed of shales and clays varying in thickness from 1 to 17 ft. Generally, this member is hard and resistant to weathering unless large quantities of water are present. However, this happens rarely. Mining in the proposed permit area has been designed to allow water to drain and not pool.

The coal has a compressive strength of 4000 psi.

ADDENDUM TO ATTACHMENT 13
THE OHIO VALLEY COAL COMPANY
PERMIT D-0360

Enclosed are chemical analyses of the roof and bottom rock from selected areas in the mine. Conditions in the application area are not expected to vary.

Water was probably encountered during drilling of core holes N84-3 and N86-14. However, the level encountered was not recorded.

SECTION 2 - AREAS ABOVE THE UNDERGROUND WORKINGS

- (a) Was subsurface water encountered while drilling these areas?
 * Yes, No. If "yes", describe the location of the sub-surface water to include stratum and depth below surface of land.
 * Drilling procedures did not include recording sub-surface water.

- (b) Describe the depth, classification, and the geologic structure of the overburden in these areas.

See Addendum No. 6

(c) **Sample No. 1	Stratum above Coal	Stratum below Coal
pyritic content	<u>0.891</u> %	<u>0.738</u> %
potential alkalinity	<u>-22.31</u>	<u>-8.05</u>
clay content	<u>n/a</u>	<u>31</u>

SECTION 3 - ANALYSIS OF THE COAL SEAM

<u>Name</u>	<u>Number</u>	<u>Total Sulfur %</u>	<u>Pyrite/Marcasite Sulfur %</u>
<u>Pittsburgh</u>	<u>8</u>	<u>3.71</u>	<u>38.8</u>
<u>Pittsburgh</u>	<u>8</u>	<u>4.38</u>	<u>47.9</u>
<u>Pittsburgh</u>	<u>8</u>	<u>4.87</u>	<u>45.5</u>

** The analyses figures on this page were derived by standard laboratory procedures using samples gathered in the coal mine. Samples were not taken during the drilling of the preceding drill hole. Drawing No. 1-83-5 in Appendix V shows the location of this sample.

SECTION 2 - AREAS ABOVE THE UNDERGROUND WORKINGS

- (a) Was subsurface water encountered while drilling these areas?
 * Yes, No. If "yes", describe the location of the sub-surface water to include stratum and depth below surface of land.
 * Drilling procedures did not include recording sub-surface water.

- (b) Describe the depth, classification, and the geologic structure of the overburden in these areas.

See Addendum No. 6

(c) **Sample No. 2	Stratum above Coal	Stratum below Coal
pyritic content	<u>5.70 %</u>	<u>0.05 %</u>
potential alkalinity	<u>-175.70</u>	<u>459</u>
clay content	<u>n/a</u>	<u>19</u>

SECTION 3 - ANALYSIS OF THE COAL SEAM

<u>Name</u>	<u>Number</u>	<u>Total Sulfur %</u>	<u>Pyrite/Marcasite Sulfur %</u>
<u>Pittsburgh</u>	<u>8</u>	<u>3.71</u>	<u>38.8</u>
<u>Pittsburgh</u>	<u>8</u>	<u>4.38</u>	<u>47.9</u>
<u>Pittsburgh</u>	<u>8</u>	<u>4.87</u>	<u>45.5</u>

** The analyses figures on this page were derived by standard laboratory procedures using samples gathered in the coal mine. Samples were not taken during the drilling of the preceding drill hole. Drawing No. 1-83-5 in Appendix V shows the location of this sample.

SECTION 2 - AREAS ABOVE THE UNDERGROUND WORKINGS

- (a) Was subsurface water encountered while drilling these areas?
 * Yes, No. If "yes", describe the location of the sub-
 surface water to include stratum and depth below surface of land.

*Drilling procedures did not include recording sub-surface water.

- (b) Describe the depth, classification, and the geologic structure of
 the overburden in these areas.

See Addendum No. 6

(c) ** Sample No. 3	Stratum above Coal	Stratum below Coal
pyritic content	<u>1.22 %</u>	<u>0.31 %</u>
potential alkalinity	<u>-40.15</u>	<u>215.3</u>
clay content	<u>n/a</u>	<u>20</u>

SECTION 3 - ANALYSIS OF THE COAL SEAM

<u>Name</u>	<u>Number</u>	<u>Total Sulfur %</u>	<u>Pyrite/Marcasite Sulfur %</u>
<u>Pittsburgh</u>	<u>8</u>	<u>3.71</u>	<u>38.8</u>
<u>Pittsburgh</u>	<u>8</u>	<u>4.38</u>	<u>47.9</u>
<u>Pittsburgh</u>	<u>8</u>	<u>4.87</u>	<u>45.5</u>

** The analyses figures on this page were derived by standard laboratory
 procedures using samples gathered in the coal mine. Samples were not
 taken during the drilling of the preceding drill hole. Drawing No. 1-83-5
 in Appendix V shows the location of this sample.

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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole #N86-14

*Coordinates: X.2431175 Y.716310 Surface Elevation 1246 ft

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	_____	_____	_____
Subsoil	_____	_____	_____
Clay	_____	2.00	EV
Sandstone	_____	0.80	ES
Clay	_____	3.50	EV
Clay	_____	.70	EV
Limestone	_____	.20	AK, ES
Shale	_____	5.50	EM
Shale	_____	2.10	EM
Claystone	_____	1.00	EV
Limestone	_____	1.20	AK, ES

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

E = Erodible (V=Very, M=Moderate, S=Slight)

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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole # N36-14

*Coordinates: X 2431175 Y. 716310 Surface Elevation 1246 ft

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	_____	_____	_____
Subsoil	_____	_____	_____
<u>Claystone</u>	_____	<u>0.40</u>	<u>EV</u>
<u>Shale</u>	_____	<u>2.00</u>	<u>EM</u>
<u>Clay</u>	_____	<u>2.50</u>	<u>EV</u>
<u>Shale</u>	_____	<u>9.00</u>	<u>EM</u>
<u>Shale</u>	_____	<u>1.80</u>	<u>EM</u>
<u>Shale</u>	_____	<u>1.50</u>	<u>EM</u>
<u>Sandstone</u>	_____	<u>2.30</u>	<u>ES</u>
<u>Shale</u>	_____	<u>14.20</u>	<u>EM</u>
<u>Claystone</u>	_____	<u>2.30</u>	<u>EV</u>

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

E = Erodible (V=Very, M=Moderate, S=Slight)

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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole #N86-14

*Coordinates: X.2431175 Y.716310 Surface Elevation 1246 ft

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	---	---	---
Subsoil	---	---	---
Limestone	---	0.90	AK, ES
Claystone	---	7.60	EV
Limestone	---	2.10	AK, ES
Shale	---	0.90	EM
Shale	---	3.60	EM
Claystone	---	0.60	EV
Shale	---	2.60	EM
Claystone	---	0.40	EV
Claystone	---	19.60	EV

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
---	---	---	---	---	---
---	---	---	---	---	---
---	---	---	---	---	---

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

E = Erodible (V=Very, M=Moderate, S=Slight)

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**OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION**

**ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)**

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole #N86-14

*Coordinates: X. 2431175 Y. 716310 Surface Elevation 1246 ft

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	—	—	—
Subsoil	—	—	—
Claystone	—	10.40	EV
Shale	—	15.00	—
Shale	—	10.00	EM
Shale	—	7.50	EM
Shale	—	11.00	EM
Claystone	—	5.40	EV
Shale	—	8.40	EM
Claystone	—	17.80	EV
Sandstone	—	1.50	ES

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

E = Erodible (V=Very, M=Moderate, S=Slight)

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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole #N86-14

*Coordinates: X. 2431175 Y. 716310 Surface Elevation 1246 ft

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	_____	_____	_____
Subsoil	_____	_____	_____
Shale	_____	15.00	EM
Shale	_____	9.00	EM
Shale	_____	1.80	EM
Shale	_____	2.60	EM
Shale	_____	2.30	EM
Shale	_____	2.10	EM
Shale	_____	0.25	EM
Coal	_____	1.45	AC, ES
Shale	_____	2.60	EM

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

E = Erodible (V=Very, M=Moderate, S=Slight)

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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole # N86-14

*Coordinates: X. 2431175 Y. 716310 Surface Elevation 1246 ft

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	—	—	—
Subsoil	—	—	—
Shale	—	4.00	EM
Shale	—	3.60	EM
Coal	—	0.40	AC, ES
Shale	—	20.80	EM
Shale	—	10.20	EM
Shale	—	0.50	EM
Coal	—	3.00	AC, ES
Claystone	—	4.00	EV
Sandstone	—	2.10	ES

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

E = Erodible (V=Very, M=Moderate, S=Slight)

3/90

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole #N86-14

*Coordinates: X. 2431175 Y. 716310 Surface Elevation 1246 ft

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	_____	_____	_____
Subsoil	_____	_____	_____
Shale	_____	4.90	EM
Limestone	_____	0.60	AK, ES
Shale	_____	5.70	EM
Limestone	_____	2.50	AK, ES
Shale	_____	5.00	EM
Limestone	_____	10.00	AK, ES
Shale	_____	28.00	EM
Limestone	_____	6.00	AK, ES
Shale	_____	2.00	EM

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

E = Erodible (V=Very, M=Moderate, S=Slight)

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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole # N86-14

*Coordinates: x 2431175 y. 716310 Surface Elevation 1246 ft

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	---	---	---
Subsoil	---	---	---
Limestone	---	8.30	AK, ES
Shale	---	2.40	EM
Limestone	---	2.50	AK, ES
Limestone	---	6.10	AK, ES
Shale	---	8.40	EM
Limestone	---	7.70	AK, ES
Shale	---	2.20	EM
Claystone	---	2.80	EV
Shale	---	0.20	EM

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
---	---	---	---	---	---
---	---	---	---	---	---
---	---	---	---	---	---

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

E = Erodible (V=Very, M=Moderate, S=Slight)

3/90

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole #N86-14

*Coordinates: X. 2431175 Y. 716310 Surface Elevation 1246 ft

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	—	—	—
Subsoil	—	—	—
Coal	—	2.30	AC, ES
Shale	—	0.50	EM
Shale	—	1.50	EM
Shale	—	5.10	EM
Limestone	—	3.20	AK, ES
Shale	—	9.30	EM
Limestone	—	2.60	AK, ES
Claystone	—	1.50	EV
Shale	—	1.10	EM

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

E = Erodible (V=Very, M=Moderate, S=Slight)

3/90

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole #N86-14

*Coordinates: X. 2431175 Y. 716310 Surface Elevation 1246 ft

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	_____	_____	_____
Subsoil	_____	_____	_____
<u>Limestone</u>	_____	<u>20.10</u>	<u>AK, ES</u>
<u>Claystone</u>	_____	<u>3.00</u>	<u>EV</u>
<u>Limestone</u>	_____	<u>2.40</u>	<u>AK, ES</u>
<u>Claystone</u>	_____	<u>3.00</u>	<u>EV</u>
<u>Shale</u>	_____	<u>0.80</u>	<u>EM</u>
<u>Shale</u>	_____	<u>1.00</u>	<u>EM</u>
<u>Shale</u>	_____	<u>4.20</u>	<u>EM</u>
<u>Limestone</u>	_____	<u>9.80</u>	<u>AK, ES</u>
<u>Shale</u>	_____	<u>0.30</u>	<u>EM</u>

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

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3/90

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole #N86-14

*Coordinates: X. 2431175 Y. 716310 Surface Elevation 1246 ft

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	_____	_____	_____
Subsoil	_____	_____	_____
Limestone	_____	5.50	AK, ES
Claystone	_____	0.80	EV
Limestone	_____	2.20	AK, ES
Claystone	_____	2.10	EV
Claystone	_____	0.30	EV
Shale	_____	0.40	EM
Claystone	_____	0.90	EV
Shale	_____	0.13	EM
Coal	_____	0.08	AC, ES

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

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3/90

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole #N86-14

*Coordinates: X 2431175 Y. 716310 Surface Elevation 1246 ft

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	_____	_____	_____
Subsoil	_____	_____	_____
Shale	_____	0.24	EM
Shale	_____	0.71	EM
Coal	_____	4.54	AC, ES
Shale	_____	0.40	EM
Shale	_____	2.70	EM
Shale	_____	9.70	EM
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

E = Erodible (V=Very, M=Moderate, S=Slight)



LJ HUGHES & SONS, INC.

DIAMOND CORE DRILLING

Pressure Grouting, Foundation & Soil Borings

320 Turnpike Road, Summersville, West Virginia 26651 (304) 872-1111

DRILL HOLE NO. N-86-14

DRILLER: JOSEPH MILLER

DRILLING FOR: THE NACCO MINING COMPANY, POWHATAN POINT, OHIO

SURFACE ELEVATION: 1246'

STARTED: JULY 31, 1986
COMPLETED: AUGUST 5, 1986

LOCATION: OHIO, BELMONT COUNTY

SMITH TOWNSHIP
SECTION 20
SOUTHWEST 1/4.

FORMATION	STRATA THICKNESS	DEPTH FROM SURFACE
CASING	17.60	17.60
SOFT GRAY CLAY	2.00	19.60
CORE LOSS	9.60	29.20
BROWN SANDSTONE	0.80	30.00
BROWN CLAY	3.50	33.50
CORE LOSS	6.50	40.00
SOFT GRAY CLAY	0.70	40.70
LIMESTONE	0.20	40.90
CORE LOSS	14.10	55.00
BROWN CLAY SHALE	5.50	60.50
GRAY SHALE	2.10	62.60
SOFT GRAY CLAYSTONE	1.00	63.60
LIMESTONE	1.20	64.80
RED CLAYSTONE	0.40	65.20
CORE LOSS	9.80	75.00
RED CLAYSHALE	2.00	77.00
GRAY CLAY	2.50	79.50
CORE LOSS	5.50	85.00
GRAY LIMY SHALE	9.00	94.00
SOFT RED AND GRAY CLAYSHALE	1.80	95.80
CORE LOSS	4.20	100.00
GRAY LIMY SHALE	1.50	101.50
GRAY SANDSTONE WITH SHALE	2.30	103.80
STREAKS		
GRAY SHALE	14.20	118.00
SOFT GRAY CLAYSTONE	2.30	120.30
LIMESTONE	0.90	121.20
GRAY CLAYSTONE	7.60	128.80
LIMESTONE	2.10	130.90

LJ HUGHES & SONS, INC.

THE NACCO MINING COMPANY

CONTINUATION OF DRILL HOLE NO. N-86-14

FORMATION	STRATA THICKNESS	DEPTH FROM SURFACE
		130.90
GRAY SHALE	0.90	131.80
GRAY LIMY SHALE	3.60	135.40
SOFT GRAY CLAYSTONE	0.60	136.00
GRAY LIMY SANDY SHALE	2.60	138.60
SOFT GRAY CLAYSTONE	0.40	139.00
CORE LOSS	6.00	145.00
GRAY CLAYSTONE	19.60	164.60
DARK GRAY CLAYSTONE	10.40	175.00
DARK GRAY SANDY SHALE	15.00	190.00
GRAY SHALE	10.00	200.00
GRAY SANDY SHALE	7.50	207.50
GRAY SHALE	11.00	218.50
RED AND GRAY CLAYSTONE	5.40	223.90
GRAY LIMY SANDY SHALE	8.40	232.30
GRAY LIMY CLAYSTONE	17.80	250.10
GRAY LIMY SANDSTONE	1.50	251.60
GRAY SANDY LIMY SHALE	15.00	266.60
GRAY LIMY SHALE	9.00	275.60
GRAY SANDY SHALE	1.80	277.40
GRAY SHALE	2.60	280.00
GRAY SANDY SHALE	2.30	282.30
GRAY SHALE	2.10	284.40
DARK SHALE WITH PYRITE	0.25	284.65
COAL	1.05	285.70
BLACK SHALE WITH PYRITE	0.30	286.00
COAL	0.10	286.10
GRAY SANDY SHALE	2.60	288.70
GRAY SANDSTONE WITH SHALE STREAKS	4.00	292.70
GRAY SHALE	3.60	296.30
COAL	0.40	296.70
GRAY LIMY CLAYSHALE	20.80	317.50
GRAY SANDY SHALE	10.20	327.70
GRAY SHALE	0.50	328.20
COAL	0.40	328.60
GRAY CLAYSHALE	1.45	330.05
COAL	0.15	330.20
DARK GRAY CLAYSHALE	0.50	330.70
COAL	0.50	331.20
GRAY CLAYSTONE	4.00	335.20
GRAY SANDSTONE	2.10	337.30
GRAY SHALE	4.90	342.20
LIMESTONE	0.60	342.80
GRAY LIMY SHALE	5.70	348.50
LIMESTONE	2.50	351.00
GRAY LIMY SHALE	5.00	356.00
LIMESTONE	10.00	366.00
GRAY LIMY SHALE	28.00	394.00

WAYNESBURG (No. 11)

UNIONTOWN (No. 10)

LJ HUGHES & SONS, INC.

THE NACCO MINING COMPANY

CONTINUATION OF DRILL HOLE NO. N-86-14

FORMATION	STRATA THICKNESS	DEPTH FROM SURFACE
		394.00
LIMESTONE	6.00	400.00
GRAY LIMY SHALE	2.00	402.00
LIMESTONE	8.30	410.30
GREEN LIMY SHALE	2.40	412.70
SANDY LIMESTONE	2.50	415.20
LIMESTONE	6.10	421.30
GRAY LIMY SHALE	8.40	429.70
LIMESTONE	7.70	437.40
DARK GRAY LIMY SHALE	2.20	439.60
DARK GRAY CLAYSTONE	2.80	442.40
BLACK SHALE	0.20	442.60
COAL	2.30	444.90
BLACK SHALE	0.50	445.40
GRAY SHALE	1.50	446.90
GRAY LIMY SHALE	5.10	452.00
LIMESTONE	3.20	455.20
GRAY LIMY SHALE	9.30	464.50
LIMESTONE	2.60	467.10
GRAY CLAYSTONE	1.50	468.60
DARK GRAY SHALE	1.10	469.70
LIMESTONE	20.10	489.80
GREEN CLAYSTONE	3.00	492.80
LIMESTONE	2.40	495.20
GRAY CLAYSTONE	3.00	498.20
DARK LIMY SHALE	0.80	499.00
GRAY CLAYSHALE	1.00	500.00
GRAY LIMY SHALE	4.20	504.20
LIMESTONE	9.80	514.00
DARK LIMY SHALE	0.30	514.30
LIMESTONE	5.50	519.80
SOFT GRAY CLAYSTONE	0.80	520.60
LIMESTONE	2.20	522.80
GRAY CLAYSTONE	2.10	524.90
DARK GRAY CLAYSTONE	0.30	525.20
GRAY SHALE	0.40	525.60
SOFT GRAY CLAYSTONE	0.90	526.50
DARK SHALE	0.13	526.63
COAL	0.08	526.71
DARK SHALE	0.24	526.95
GRAY SHALE	0.71	527.66
BONE	0.04	527.70
COAL	4.30	532.00
BONY COAL	0.10	532.10
COAL	0.10	532.20
GRAY SHALE	0.40	532.60
GRAY LIMY SHALE	2.70	535.30
GRAY SANDY LIMY SHALE	9.70	545.00

SEWICKLEY (No. 9)

PITTSBURGH (No. 8)

TOTAL DEPTH: 545 FEET
20 BAGS CEMENT PLACED IN HOLE

11/89

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole # N-90-1

*Coordinates: X. 2423280 Y. 719860 Surface Elevation 1279.5'

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	—	<u>3.00</u>	—
Subsoil	—	<u>6.00</u>	—
Shale	—	<u>2.00</u>	<u>CS, EM</u>
Sandstone	—	<u>9.00</u>	<u>CS, ES</u>
Med. Sandstone	—	<u>2.5</u>	<u>CS, ES</u>
Shale	—	<u>6.5</u>	<u>CS, EM</u>
Shale	—	<u>4.0</u>	<u>CS, EM</u>
Sandstone	—	<u>5.0</u>	<u>CS, ES</u>
Shale	—	<u>2.0</u>	<u>CS, EM</u>
Sandstone	—	<u>2.0</u>	<u>CS, ES</u>
Shale	<u>X</u>	<u>4.0</u>	<u>CS, EM</u>

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Marcasite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
<u>Roof</u>	<u>2.70%</u>	<u>2.80%</u>	<u>84.35</u>	<u>73.1 T/1000T</u>	<u>11.2 T/1000T</u>
<u>Coal</u>	<u>4.07%</u>	<u>2.70%</u>	<u>127.15</u>	<u>10.57 T/1000T</u>	<u>117 T/1000T</u>
<u>Floor</u>	<u>2.80%</u>	<u>2.80%</u>	<u>87.47</u>	<u>212.94 T/1000T</u>	<u>-127 T/1000T</u>

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

E = Erodible (V=Very, M=Moderate, S=Slight)

11/89

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole # N-90-1

*Coordinates: X. _____ Y. _____ Surface Elevation 1279.5'

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	_____	_____	_____
Subsoil	_____	_____	_____
<u>Sandstone</u>	<u>X</u>	<u>4.0</u>	<u>CS,ES</u>
<u>Sandstone</u>	_____	<u>6.0</u>	<u>CS,ES</u>
<u>Shale</u>	_____	<u>18.0</u>	<u>CS,EM</u>
<u>Clay</u>	_____	<u>2.0</u>	<u>CV,EM</u>
<u>Shale</u>	_____	<u>4.0</u>	<u>CS,EM</u>
<u>Shale</u>	_____	<u>24.0</u>	<u>CS,EM</u>
<u>Shale</u>	_____	<u>18.0</u>	<u>CS,EM</u>
<u>Siltstone</u>	_____	<u>18.0</u>	<u>CM,EM</u>
<u>Shale</u>	_____	<u>7.0</u>	<u>CS,EM</u>

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Marcasite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole # N-90-1

*Coordinates: X. _____ Y. _____ Surface Elevation 1279.5'

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	_____	_____	_____
Subsoil	_____	_____	_____
<u>Lime</u>	_____	<u>4.0</u>	<u>CS, ES, AK</u>
<u>Shale</u>	_____	<u>10.0</u>	<u>CS, EM</u>
<u>Shale</u>	_____	<u>5.0</u>	<u>CS, EM</u>
<u>Shale</u>	_____	<u>1.0</u>	<u>CS, EM</u>
<u>Sandstone</u>	_____	<u>5.0</u>	<u>CS, ES</u>
<u>Siltstone</u>	_____	<u>9.0</u>	<u>CM, EM</u>
<u>Lime</u>	_____	<u>3.0</u>	<u>CS, ES, AK</u>
<u>Shale</u>	_____	<u>6.0</u>	<u>CS, EM</u>
<u>Shale</u>	_____	<u>2.0</u>	<u>CS, EM</u>

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Marcasite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

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C = Compactible (V=Very, M=Moderate, S=Slight)

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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole # N-90-1

*Coordinates: X. _____ Y. _____ Surface Elevation 1279.5'

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	_____	_____	_____
Subsoil	_____	_____	_____
<u>Shale</u>	_____	<u>3.0</u>	<u>CS, EM</u>
<u>Shale</u>	_____	<u>1.5</u>	<u>CS, EM</u>
<u>Coal</u>	_____	<u>1.5</u>	<u>CS, EM, AC</u>
<u>Clay</u>	_____	<u>1.0</u>	<u>CV, EM</u>
<u>Sandstone</u>	_____	<u>2.0</u>	<u>CS, ES</u>
<u>Shale</u>	_____	<u>4.0</u>	<u>CS, EM</u>
<u>Sandstone</u>	_____	<u>11.0</u>	<u>CS, ES</u>
<u>Sandstone</u>	_____	<u>6.0</u>	<u>CS, ES</u>
<u>Sandstone</u>	_____	<u>12.0</u>	<u>CS, ES</u>

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Marcasite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

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11/89

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole # N-90-1

*Coordinates: X. _____ Y. _____ Surface Elevation 1279.5'

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
<u>Topsoil</u>	_____	_____	_____
<u>Subsoil</u>	_____	_____	_____
<u>Shale</u>	_____	<u>10.0</u>	<u>CS, EM</u>
<u>Clay</u>	_____	<u>8.0</u>	<u>CV, EM</u>
<u>Siltstone</u>	_____	<u>12.0</u>	<u>CM, EM</u>
<u>Sandstone</u>	<u>X</u>	<u>12.0</u>	<u>CS, ES</u>
<u>Shale</u>	_____	<u>5.0</u>	<u>CS, EM</u>
<u>Siltstone</u>	_____	<u>15.0</u>	<u>CM, EM</u>
<u>Sandstone</u>	_____	<u>6.0</u>	<u>CS, ES</u>
<u>Coal</u>	_____	<u>1.0</u>	<u>CS, EM, AC</u>
<u>Siltstone</u>	_____	<u>3.0</u>	<u>CM, EM</u>

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Marcasite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

E = Erodible (V=Very, M=Moderate, S=Slight)

11/89

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole # N-90-1

*Coordinates: X. _____ Y. _____ Surface Elevation 1279.5'

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
<u>Topsoil</u>	_____	_____	_____
<u>Subsoil</u>	_____	_____	_____
<u>Sandstone</u>	_____	<u>7.0</u>	<u>CS, ES</u>
<u>Coal</u>	_____	<u>1.0</u>	<u>CS, EM, AC</u>
<u>Shale</u>	_____	<u>10.0</u>	<u>CS, EM</u>
<u>Siltstone</u>	_____	<u>9.0</u>	<u>CM, EM</u>
<u>Sandstone</u>	_____	<u>17.0</u>	<u>CS, ES</u>
<u>Sandstone</u>	_____	<u>8.0</u>	<u>CS, ES</u>
<u>Silt</u>	_____	<u>3.0</u>	<u>CM, EM</u>
<u>Sandstone</u>	_____	<u>5.0</u>	<u>CS, ES</u>
<u>Shale</u>	_____	<u>7.0</u>	<u>CS, EM</u>

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Marcasite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

E = Erodible (V=Very, M=Moderate, S=Slight)

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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole # N-90-1

*Coordinates: X. _____ Y. _____ Surface Elevation 1279.5'

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	_____	_____	_____
Subsoil	_____	_____	_____
Shale	_____	8.0	CS, EM
Lime	_____	10.0	CS, ES, AK
Lime	_____	55.0	CS, ES, AK
Shale	_____	3.0	CS, EM
Lime	_____	5.0	CS, ES, AK
Lime	_____	6.0	CS, ES, AK
Sandstone	_____	5.0	CS, ES
Shale	_____	5.0	CS, EM
Coal	_____	4.0	CS, EM, AC

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Marcasite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

E = Erodible (V=Very, M=Moderate, S=Slight)

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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole # N-90-1

*Coordinates: X. _____ Y. _____ Surface Elevation 1279.5'

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	_____	_____	_____
Subsoil	_____	_____	_____
Siltstone	_____	8.0	CM, EM
Lime	_____	29.0	CS, ES, AK
Lime	_____	3.0	CS, ES, AK
Lime	_____	5.0	CS, ES, AK
Lime	_____	6.0	CS, ES, AK
Lime	_____	8.0	CS, ES, AK
Lime	_____	5.0	CS, ES, AK
Clay	_____	4.0	CV, EM
Coal	_____	6.0	CS, EM, AC

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Marcasite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

E = Erodible (V=Very, M=Moderate, S=Slight)

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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole # N-90-1

*Coordinates: X. _____ Y. _____ Surface Elevation 1279.5'

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	_____	_____	_____
Subsoil	_____	_____	_____
Clay	_____	1.0	CV, EM
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Marcasite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

E = Erodible (V=Very, M=Moderate, S=Slight)

TEST HOLE NO. N-90-1
SURFACE ELEVATION 1279.5'

<u>FROM</u>	<u>TO</u>	<u>TYPE OF FORMATION</u>
0	3	Topsoil
3	9	Brown clay
9	11	Gray shale
11	18	Gray sandstone
18	20.5	Med gray sandstone
20.5	27	Gray & brown shale
27	31	Gray sandy shale
31	36	Gray sandstone
36	38	Dark gray shale/black
38	40	Gray sandstone/fine
40	46	Gray sandy shale/damp
46	50	Gray sandstone/water
50	56	Brown sandstone
56	74	Gray shale
74	76	Red clay
76	80	Gray sandy shale
80	104	Gray shale
104	122	Gray sandy shale
122	140	Gray silt stone
140	147	Dark gray shale
147	151	Lime
151	161	Gray medium shale
161	165	Gray sandy shale
165	166	Gray sandy shale
166	171	Gray sandstone/medium
171	180	Dark gray silt stone
180	183	Lime
183	189	Gray shale
189	191	Dark gray sandy shale
191	194	Dark gray shale
194	195.5	Black sandy shale
195.5	197	Coal (No. 12)
197	198	Gray clay
198	200	Gray sandstone
200	204	Dark gray sandy shale
204	215	Dark gray sandstone
215	221	Gray sandstone
221	233	Dark sandstone
233	243	Dark gray shale
243	251	Clay
251	263	Gray siltstone
263	271	Gray sandstone/medium water
271	276	Gray sandy shale
276	291	Gray silt stone
291	297	Gray sandstone/fine
297	298	Coal (No. 11)
298	301	Gray silt stone
301	308	Gray sandstone
308	309	Coal (No. 10)

TEST HOLE NO. N-90-1 (CONTINUED)
SURFACE ELEVATION 1279.5'

<u>FROM</u>	<u>TO</u>	<u>TYPE OF FORMATION</u>
309	319	Dark gray sandy shale
319	328	Gray silt stone
328	345	Gray sandstone/fine
345	353	Gray sandstone/fine
353	356	Gray silt - trace of coal
356	361	Gray sandstone
361	368	Gray sandy shale
363	371	Dark gray sandy shale
371	381	Lime
381	436	Lime w/shale bands
436	439	Green shale
439	444	Lime
444	458	Darker lime w/shale bands
458	463	Hard sandstone
463	468	Medium gray shale w/trace of coal
468	472	Coal (No. 9)
472	480	Gray/light/siltstone
480	519	Lime/hard
519	522	Lime/softer
522	527	Hard broken lime
527	533	Soft lime
533	545	Broken lime
545	550	4' 10" lime
550	554	4' 5" clay
554	560	5' 2" coal 62" (No. 8)
560	561	1' 4" clay
561	563	2' loss

Set 21'5" of 6" Casing

11/89

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole # N-90-2

*Coordinates: X. 2431550 Y. 720290 Surface Elevation 1251.5'

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	—	<u>2.0</u>	—
Subsoil	—	<u>5.0</u>	—
Clay	—	<u>3.0</u>	<u>CV, EM</u>
Shale	—	<u>3.0</u>	<u>CS, EM</u>
Lime	—	<u>6.0</u>	<u>CS, ES, AK</u>
Shale	<u>X</u>	<u>13.0</u>	<u>CS, EM</u>
Clay	—	<u>4.0</u>	<u>CV, EM</u>
Shale	—	<u>9.0</u>	<u>CS, EM</u>
Claystone	—	<u>17.0</u>	<u>CV, EM</u>
Shale	—	<u>13.0</u>	<u>CS, EM</u>
Lime	—	<u>7.0</u>	<u>CS, ES, AK</u>

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Marcasite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
<u>Roof</u>	<u>7.31%</u>	<u>5.70%</u>	<u>228.36</u>	<u>4.45 T/1000T</u>	<u>224 T/1000T</u>
<u>Coal</u>	<u>5.66%</u>	<u>4.18%</u>	<u>176.82</u>	<u>7.17 T/1000T</u>	<u>170 T/1000T</u>
<u>Floor</u>	<u>1.42%</u>	<u>1.37%</u>	<u>44.36</u>	<u>658 T/1000T</u>	<u>-613 T/1000T</u>

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

E = Erodible (V=Very, M=Moderate, S=Slight)

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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole #N-90-2

*Coordinates: X. _____ Y. _____ Surface Elevation 1251.5'

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	_____	_____	_____
Subsoil	_____	_____	_____
Silt	_____	13.0	CM, EM
Shale	_____	7.0	CS, EM
Shale	_____	13.0	CS, EM
Lime	_____	8.0	CS, ES, AK
Shale	_____	40.0	CS, EM
Shale	_____	4.5	CS, EM
Coal	_____	2.5	CS, EM, AC
Clay	_____	14.0	CV, EM
Siltstone	X	19.0	CM, EM

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Marcasite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

E = Erodible (V=Very, M=Moderate, S=Slight)

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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole # N-90-2

*Coordinates: X. _____ Y. _____ Surface Elevation 1251.5'

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	_____	_____	_____
Subsoil	_____	_____	_____
Shale	_____	25.0	CS, EM
Shale	_____	3.0	CS, EM
Siltstone	_____	26.0	CM, EM
Silt	_____	21.0	CM, EM
Coal	_____	2.0	CS, EM, AC
Silt	_____	4.0	CM, EM
Sandstone	_____	4.0	CS, ES
Siltstone	_____	6.0	CM, EM
Siltstone	_____	26.0	CM, EM

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Marcasite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

E = Erodible (V=Very, M=Moderate, S=Slight)

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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole #N-90-2

*Coordinates: X. _____ Y. _____ Surface Elevation 1251.5'

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	_____	_____	_____
Subsoil	_____	_____	_____
Siltstone	_____	6.0	CM, EM
Coal	_____	2.0	CS, EM, AC
Siltstone	_____	10.0	CM, EM
Siltstone	_____	2.0	CM, EM
Silt	X	21.0	CM, EM
Silt	_____	80.0	CM, EM
Shale	_____	3.0	CS, EM
Coal	_____	3.0	CS, EM, AC
Siltstone	_____	8.0	CM, EM

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Marcasite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

E = Erodible (V=Very, M=Moderate, S=Slight)

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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole # N-90-2

*Coordinates: X. _____ Y. _____ Surface Elevation 1251.5'

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	_____	_____	_____
Subsoil	_____	_____	_____
Clay	_____	<u>1.0</u>	<u>CV, EM</u>
Clay	_____	<u>4.0</u>	<u>CV, EM</u>
Shale	_____	<u>6.0</u>	<u>CS, EM</u>
Coal	_____	<u>2.0</u>	<u>CS, EM, AC</u>
Lime	_____	<u>26.0</u>	<u>CS, ES, AK</u>
Silt	_____	<u>3.0</u>	<u>CM, EM</u>
Lime	_____	<u>4.0</u>	<u>CS, ES, AK</u>
Sandstone	_____	<u>6.0</u>	<u>CS, ES</u>
Sandstone	_____	<u>15.0</u>	<u>CS, ES</u>

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Marcasite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

*If other than State Plane, indicate coordinate system.

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Physical Property Legend

AC = Acid Producing

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C = Compactible (V=Very, M=Moderate, S=Slight)

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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole # N-90-2

*Coordinates: X. _____ Y. _____ Surface Elevation 1251.5'

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	_____	_____	_____
Subsoil	_____	_____	_____
Clay	_____	<u>4.0</u>	<u>CV, EM</u>
Coal	_____	<u>1.0</u>	<u>CS, EM, AC</u>
Clay	_____	<u>1.0</u>	<u>CV, EM</u>
Coal	_____	<u>3.0</u>	<u>CS, EM, AC</u>
Slate	_____	<u>1.0</u>	<u>CS, ES</u>
Clay	_____	<u>7.0</u>	<u>CV, EM</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Marcasite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

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C = Compactible (V=Very, M=Moderate, S=Slight)

E = Erodible (V=Very, M=Moderate, S=Slight)

TEST HOLE NO. N-90-2
SURFACE ELEVATION 1251.5'

FROM	TO	TYPE OF FORMATION
0	2	Top soil - brown clay
2	7	Brown sandstone
7	10	Brown clay
10	13	Brown sandy shale
13	19	Lime w/shale bands
19	32	Gray/brown sandy shale water at 21'
32	36	Brown clay
36	45	Gray sandy shale
45	62	Gray clay stone
62	75	Gray sandy shale
75	82	Lime sandstone/fine
82	95	Gray silt
95	102	Red sandy shale
102	115	Gray sandy shale
115	123	Lime
123	163	Gray sandy shale
163	167.5	Black shale
167.5	170	Coal (No. 12)
170	184	Clay dark gray
184	203	Gray siltstone damp
203	228	Gray sandy shale
228	231	Red sandy shale
231	257	Gray siltstone
257	278	Dark gray silt/hard
278	280	Coal (No. 11)
280	284	Gray silt
284	288	Gray sandstone/fine
288	294	Dark gray siltstone
294	320	Gray siltstone
320	326	Dark gray siltstone
326	328	Coal (No. 10)
328	338	Gray siltstone
338	340	Dark gray siltstone
340	361	Gray silt w/lime bands/damp
361	441	Light gray silt w/shale bands
441	444	Gray shale
444	447	Coal (No. 9)
447	455	Gray siltstone
455	456	Gray clay
456	460	Light clay
460	466	Dark gray shale
466	468	Coal (No. 9A)
468	494	Lime w/shale bands
494	497	Dark gray silt
497	501	Lime
501	507	Dark gray sandstone
507	522	Light sandstone w/shale bands

TEST HOLE NO. N-90-2 (CONTINUED)
SURFACE ELEVATION 1251.5'

<u>FROM</u>	<u>TO</u>	<u>TYPE OF FORMATION</u>
522	526	3'8-1/2" clay
526	527	12" coal
527	528	12" binder
528	533	4'10-1/2" coal (No. 8)
533	534)	8" slate
	534)	2" coal
534	541	7'9" clay

Set 33' of 6" Casing

11/89

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole # N-90-3

*Coordinates: X. 2423210 Y. 717730 Surface Elevation 1104.5'

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
<u>Topsoil</u>	<u>—</u>	<u>4.0</u>	<u>—</u>
<u>Subsoil</u>	<u>—</u>	<u>1.0</u>	<u>—</u>
<u>Siltstone</u>	<u>—</u>	<u>13.0</u>	<u>CM, EM</u>
<u>Clay</u>	<u>—</u>	<u>3.0</u>	<u>CV, EM</u>
<u>Shale</u>	<u>X</u>	<u>20.0</u>	<u>CS, EM</u>
<u>Siltstone</u>	<u>X</u>	<u>29.0</u>	<u>CM, EM</u>
<u>Clay</u>	<u>—</u>	<u>3.0</u>	<u>CV, EM</u>
<u>Siltstone</u>	<u>X</u>	<u>9.0</u>	<u>CM, EM</u>
<u>Limestone</u>	<u>—</u>	<u>1.0</u>	<u>CS, ES, AK</u>
<u>Shale</u>	<u>—</u>	<u>13.0</u>	<u>CS, EM</u>
<u>Limestone</u>	<u>—</u>	<u>2.0</u>	<u>CS, ES, AK</u>

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Marcasite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
<u>Roof</u>	<u>1.84%</u>	<u>1.83%</u>	<u>57.48</u>	<u>13.1 T/1000T</u>	<u>45.3T/1000T</u>
<u>Coal</u>	<u>4.26%</u>	<u>2.10%</u>	<u>133.08</u>	<u>5.02 T/1000T</u>	<u>129 T/1000T</u>
<u>Floor</u>	<u>2.05%</u>	<u>1.85%</u>	<u>89.03</u>	<u>413 T/1000T</u>	<u>-324 T/1000T</u>

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

E = Erodible (V=Very, M=Moderate, S=Slight)

11/89

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole # N-90-3

*Coordinates: X. _____ Y. _____ Surface Elevation 1104.5'

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	_____	_____	_____
Subsoil	_____	_____	_____
Siltstone	_____	5.0	CM, EM
Clay	_____	3.0	CV, EM
Sandstone	_____	2.0	CS, ES
Siltstone	_____	6.0	CM, EM
Limestone	_____	1.0	CS, ES, AK
Shale	_____	4.0	CS, EM
Silt	_____	9.0	CM, EM
Coal	_____	2.5	CS, EM, AC
Siltstone	_____	7.5	CM, EM

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Marcasite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

E = Erodible (V=Very, M=Moderate, S=Slight)

11/89

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole #N-90-3

*Coordinates: X. _____ Y. _____ Surface Elevation 1104.5'

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	_____	_____	_____
Subsoil	_____	_____	_____
Siltstone	_____	<u>39.0</u>	<u>CM, EM</u>
Coal	_____	<u>2.0</u>	<u>CS, EM, AC</u>
Silt	_____	<u>8.0</u>	<u>CM, EM</u>
Limestone	_____	<u>8.0</u>	<u>CS, ES, AK</u>
Siltstone	_____	<u>5.0</u>	<u>CM, EM</u>
Limestone	_____	<u>11.0</u>	<u>CS, ES, AK</u>
Silt	_____	<u>12.0</u>	<u>CM, EM</u>
Limestone	_____	<u>7.0</u>	<u>CS, ES, AK</u>
Shale	_____	<u>2.0</u>	<u>CS, EM</u>

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Marcasite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

E = Erodible (V=Very, M=Moderate, S=Slight)

11/89

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole # N-90-3

*Coordinates: X. _____ Y. _____ Surface Elevation 1104.5'

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
<u>Topsoil</u>	_____	_____	_____
<u>Subsoil</u>	_____	_____	_____
<u>Limestone</u>	_____	<u>5.0</u>	<u>CS, ES, AK</u>
<u>Siltstone</u>	_____	<u>4.0</u>	<u>CM, EM</u>
<u>Siltstone</u>	_____	<u>8.0</u>	<u>CM, EM</u>
<u>Limestone</u>	_____	<u>4.0</u>	<u>CS, ES, AK</u>
<u>Shale</u>	_____	<u>1.0</u>	<u>CS, EM</u>
<u>Limestone</u>	_____	<u>1.0</u>	<u>CS, ES, AK</u>
<u>Siltstone</u>	_____	<u>2.0</u>	<u>CM, EM</u>
<u>Limestone</u>	_____	<u>23.0</u>	<u>CS, ES, AK</u>
<u>Coal</u>	_____	<u>4.0</u>	<u>CS, EM, AC</u>

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Marcasite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

E = Erodible (V=Very, M=Moderate, S=Slight)

11/89

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole #N-90-3

*Coordinates: X. _____ Y. _____ Surface Elevation 1104.5'

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	_____	_____	_____
Subsoil	_____	_____	_____
Claystone	_____	9.00	CV, EM
Limestone	_____	2.00	CS, ES, AK
Lime	_____	7.0	CS, ES, AK
Siltstone	_____	7.0	CM, EM
Limestone	_____	27.0	CS, ES, AK
Shale	_____	3.0	CS, EM
Limestone	_____	4.0	CS, ES, AK
Clay	_____	6.0	CV, EM, AC
Limestone	_____	11.0	CS, ES, AK

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Marcasite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

E = Erodible (V=Very, M=Moderate, S=Slight)

11/89

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Workings)

Applicant THE OHIO VALLEY COAL COMPANY Drill Hole # N-90-3

*Coordinates: X. _____ Y. _____ Surface Elevation 1104.5'

<u>Lithology</u>	<u>H₂O**</u>	<u>Thickness</u>	<u>Physical Properties</u>
Topsoil	_____	_____	_____
Subsoil	_____	_____	_____
Siltstone	_____	<u>11.0</u>	<u>CM, EM</u>
Coal	_____	<u>1.0</u>	<u>CS, EM, AC</u>
Silt	_____	<u>1.0</u>	<u>CM, EM</u>
Coal	_____	<u>5.0</u>	<u>CS, EM, AC</u>
Clay	_____	<u>6.0</u>	<u>CV, EM</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Submit the following information for the stratum above the coal seam, the coal seam, and the stratum below the coal seam.

<u>Stratum</u>	<u>Total Sulfur</u>	<u>Pyrite Marcasite Sulfur</u>	<u>Potential Acidity</u>	<u>Neutral-ization Potential</u>	<u>CaCO₃ Deficiency</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

*If other than State Plane, indicate coordinate system.

**Indicate water bearing stratum with an asterisk (*) under column labelled H₂O

Physical Property Legend

AC = Acid Producing

AK = Alkaline Producing

C = Compactible (V=Very, M=Moderate, S=Slight)

E = Erodible (V=Very, M=Moderate, S=Slight)

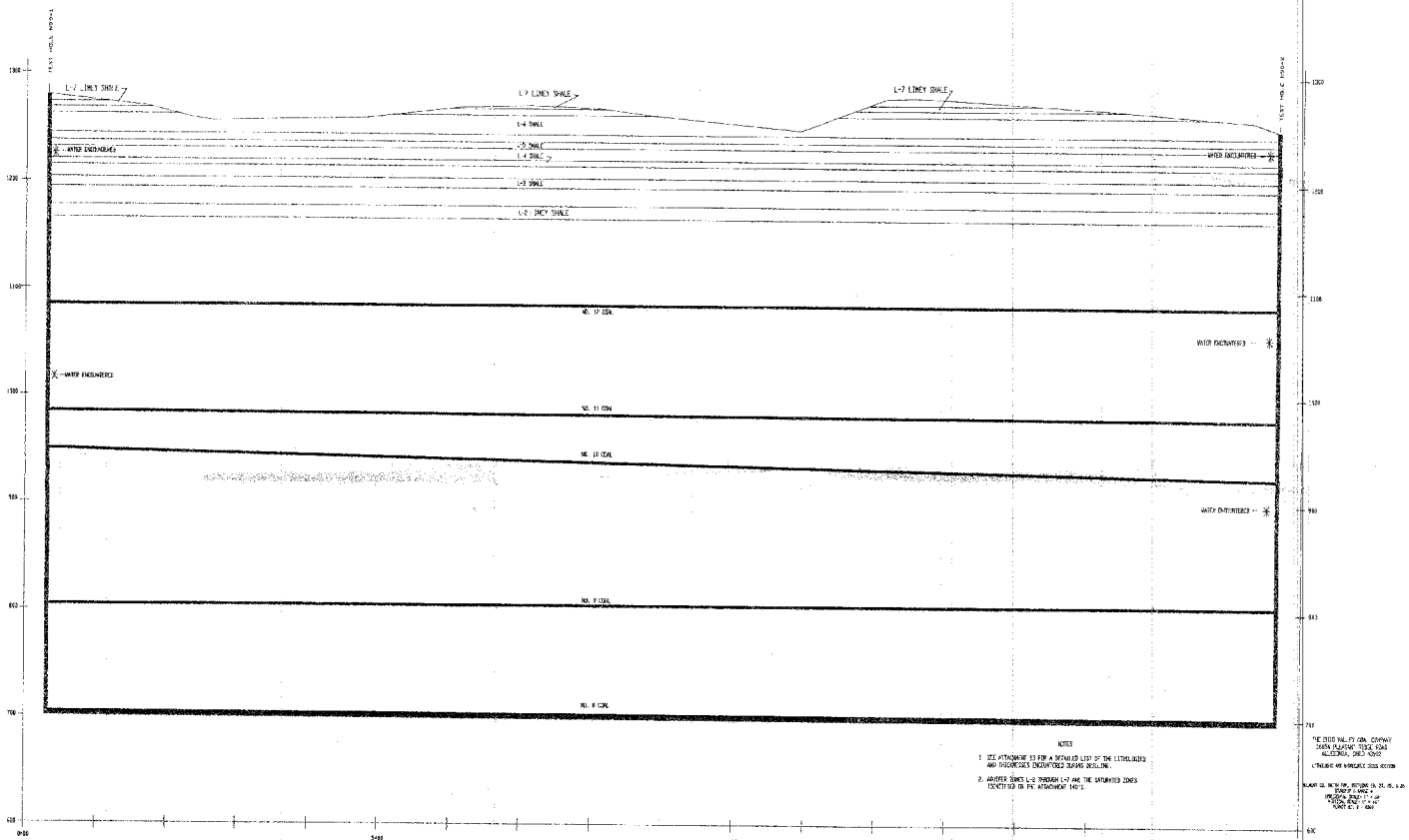
TEST HOLE NO. N-90-3
SURFACE ELEVATION 1104.5'

FROM	TO	TYPE OF FORMATION
0	4	Topsoil
4	5	Limestone
5	18	Gray siltstone
18	21	Gray clay
21	41	Black sandy shale/damp at 21'
41	72	Gray siltstone/damp at 68'
72	75	Clay
75	84	Gray siltstone/water at 81'
84	85	Limestone
85	98	Dark gray shale
98	100	Limestone
100	105	Gray siltstone
105	108	Gray shaley clay
108	110	Gray sandstone
110	116	Gray siltstone
116	117	Limestone
117	121	Gray shale w/clay streaks
121	130	Gray silt
130	132.5	Coal 2-1/2' (No. 11)
132.5	140	Gray siltstone
140	179	Dark siltstone
179	181	Coal 2' (No. 10)
181	189	Gray silt
189	197	Limestone
197	202	Gray siltstone
202	213	Limestone w/siltstone bands
213	225	Dark gray silt w/lime bands
225	232	Limestone w/shale bands
232	234	Gray shale
234	239	Limestone
239	243	Dark gray siltstone
243	251	Light gray siltstone
251	255	Limestone
255	256	Dark gray shale
256	257	Limestone
257	259	Gray siltstone
259	282	Limestone
282	286	Coal (No. 9)
286	295	Claystone
295	297	Limestone
297	304	Limey shale
304	311	Siltstone
311	338	Limestone/shale bands
338	341	Dark gray shale
341	345	Limestone
345	351	Trace of coal/clay (Redstone)
351	362	Limestone
362	373	Siltstone w/limestone
373		

TEST HOLE NO. N-90-3 (CONTINUED)
SURFACE ELEVATION 1104.5'

<u>FROM</u>	<u>TO</u>	<u>TYPE OF FORMATION</u>
374	375	Gray clay silt
378	383	Coal (No. 8)
383	389	Clay

Set 22' of 6" Casing



ADDENDUM TO PART 2, PAGE 17, B
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
PERMIT D-0360

GEOLOGY DESCRIPTION

Stratigraphy of the proposed permit area is formed by the Monongahela formation of the Pennsylvania period, and the Dunkard group of Permian time. The primary strata of both sections consists of an alternating sequence of limestone, sandstone, siltstone, shale, claystone, and coal.

The Monongahela formation is approximately 245 feet thick. In ascending order, it occupies the interval from the Pittsburgh No. 8 to the Waynesburg No. 11 Coalbed. Approximately 50 to 70 percent of this formation is made up of limestone.

The Dunkard group is 250 to 300 feet thick, occupying the interval from the Waynesburg No. 11 Coalbed to the surface. Primary rock units here include shale, siltstone, and sandstone. Limestone forms about 10 percent of the maximum total thickness.

Structurally, the Pittsburgh No. 8 Coalbed rises west to northwest at grades under one percent.

Please refer to Figure 2.

Geology and Coal Resources of Belmont County, Ohio, Geological Survey Professional Paper 380, reports that a small dome-shaped anticline lies in the eastern part of Belmont County within the eastern Smith Township near Jacobsburg. However, since this structure is located over 3 miles east of the application area, it has no impact on the ground water movement within the general area of the application. There is evidence of this structure in the Powhatan No. 3 Mine (closed in 1983), but it does not extend into the No. 6 mine reserve.

The report also indicates a graben fault extends into Smith Township, Belmont County. This structure was discovered in the Powhatan No. 3 Mine. Core drilling in the eastern part of the No. 6 Mine reserve has detected the fault. Recently, a minor gravity-type fault was intersected in the Main North entries near the southeast corner of the application area (see enclosed report). In this location, the coal seam is displaced approximately five feet. The faulted zone averages approximately 90 feet measured perpendicular to the strike of the fault. It appears that the fault displacement is decreasing to the west. At the No. 3 Mine, and in locations east of the application area, the displacement is over 40 feet. As mining encounters the fault, the mining unit will simply ramp down to the lowered part of the coal seam, and only the

normal mining height will be taken. Because the fault displacement appears to be decreasing, no differential settlement is expected. There are no structures located over the fault. No impact upon ground water movement is expected. Actually, core holes further west of the main entries indicate that the fault may not exist in that area. (See Map OV-LW-90-2 Timing, Structural Contours, and Parcel Map)

Given the general character of the formations above the Pittsburgh (No. 8) coal seam, our experience has been that most ground water has been developed directly above the tight formations such as shales or clays. These units tend to act as aquicludes and prevent downward migration of ground water. Instead, when ground water encounters these tight formations, it begins to flow horizontally along joints and bedding planes above the shale or clay. Periodically and predominantly at the head of small streams in the area, the ground water surfaces as springs that feed the streams.

GENERALIZED STRATIGRAPHIC COLUMN

FIGURE # 2

THE CHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
ADDENDUM TO PAGE 17, PART 2B
PERMIT D-0360

DUNKARD
GROUP

MONONGAHELA
FORMATION

CONEMAUGH
FORMATION

From:
U. S. Dept. of Interior
Geological Survey
Professional Paper 380

Prepared by:
MOODY & ASSOCIATES, INC.

INTER-OFFICE CORRESPONDENCE

The Ohio Valley Coal Company

ALLEDONIA, OHIO 43902

DATE: November 9, 1990

TO: Robert E. Murray

SUBJECT: North Mains Fault

FROM: William J. Siplivy *WJS*

At your request, an investigation was made to determine the nature and extent of the fault recently encountered in the north mains. The study included mine inspections on November 1 and 8, made in the company of Maynard St. John, a study of mine maps, and a review of the N86 Core Drilling Report.

Type and Location of Fault

The north mains fault is a normal or gravity-type fault. The principal stress causing the fault is vertical. The trend is N60 to 66° W.

The fault was encountered in the north mains directly east of the 8 West longwall headgate (see attached map). The north side of the fault is down-thrown with a displacement of 5 feet. In the belt entry, the coal had been rising about 5 percent prior to intersecting the fault at 43 + 36. A 5 foot vertical displacement then occurred over a lineal distance of about 30 feet. North of this fault, in the belt entry, the coal remained in a structural trough for about 100 feet before noticeably rising again. Where the seam made this elevation rise there was no evidence of shear or displacement. The seam then appeared to be rather flat-lying to gently rising toward the north main faces at 49 + 00, over 450 feet away from the sharp rise.

Based on this limited observation it is possible that the north mains are now through the fault. If so, the calculated true width of the fault is approximately 90 feet.

In the #1 entry of the north mains, at 44 + 10, the fault had a displacement of two feet. Within this zone, at least six low angle fault planes were observed in the immediate roof.

Coal Thickness

The main bench of coal generally ranged from 56 to 58 inches on both sides of the fault. Thickness discontinuities were observed only along the fault planes. About 100 feet north of the fault, the main bench reached 60 to 61 inches, then toward the current faces, thinned to 51 to 53 inches.

Roof coal is thin or completely absent throughout the fault area and to the north. These trends conform to the N86 report.

Projected Conditions

The north mains fault appears to show a relationship to the fault zone identified in the N86 report. In that report, the fault was shown to extend southwesterly from the No. 3 Mine into the No. 6 Mine reserve, then change to a northwest bearing directly north of the 3 East Submain.

Mining conditions are projected to be very severe where the bearing changes. Drilling confirms the Pittsburgh Seam has been down-thrown 40 to 50 feet in a graben-type fault, that was 800 to 900 feet wide in the No. 3 Mine.

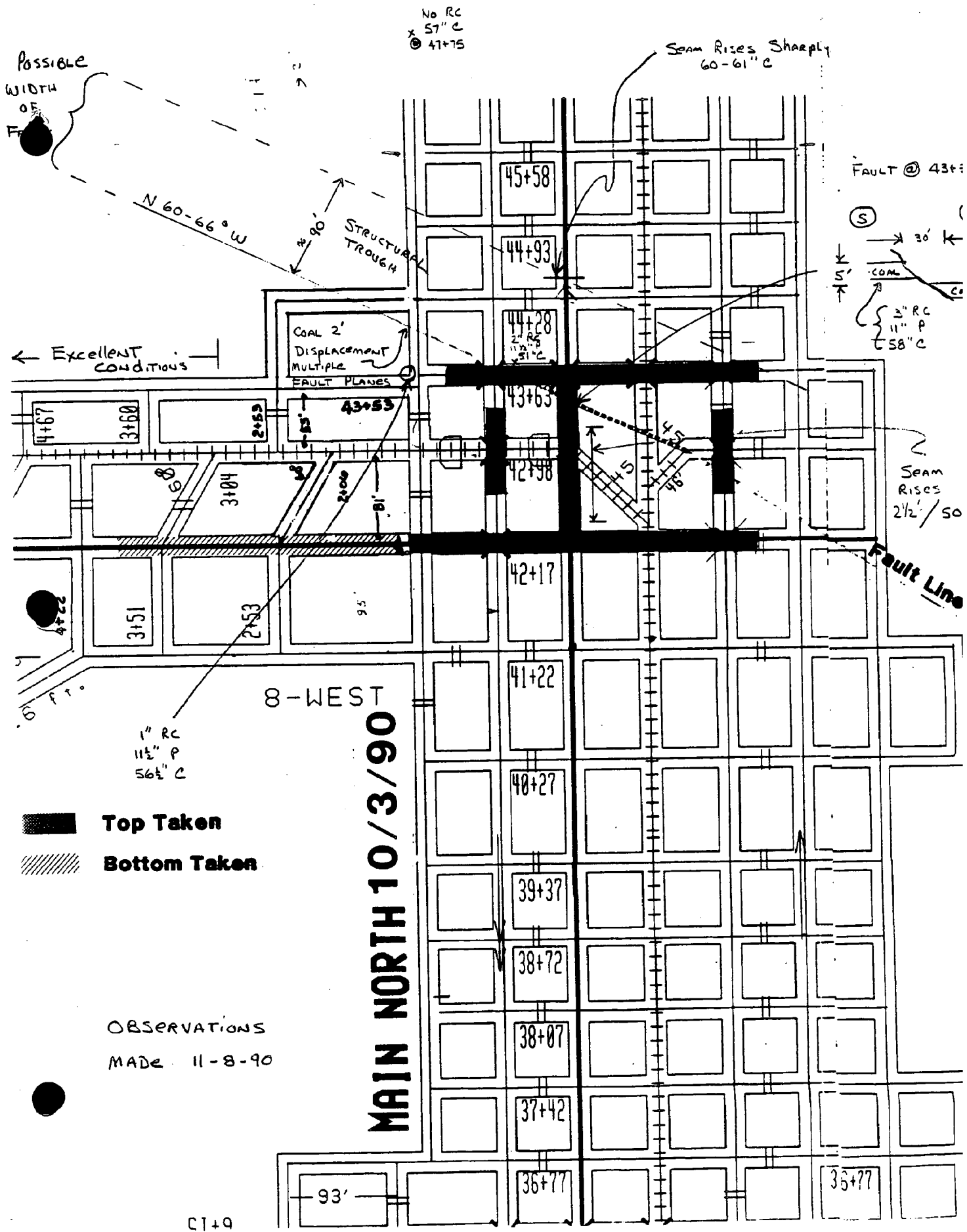
The severity of the fault appears to lessen considerably as it trends from this point to the north mains. Conditions in the north mains are troublesome but still manageable.

Predicting the extent of the fault is difficult to assess at this point in time. In the worst case, it will continue along its current bearing, pass through the 9 West longwall panel, then intersect 9 West headgate somewhere between 15 + 00 and 20 + 00. We will only know this after the 9 West headgate has been driven. On the other hand, since the fault appears to be lessening in severity northwestward, it may very well dissipate somewhere in the #9 longwall panel, possibly within 500 feet.

In my opinion, near term exploration for the fault, in the study area, should be limited to data collected from mine development. Our best predictive tool continues to be the on-going monitoring of coal elevations, main bench thickness, and the occurrence of roof coal.

Please let me know if there are any questions.

cc: M. R. St. John
J. R. Forrelli
C. H. Daub
C. R. Kaluger
F: No. 6 / FAULT



- B. (2) Submit an addendum describing how the areal and structural geology may affect the occurrence, availability, movement, quantity, and quality of potentially affected surface and ground waters per paragraph (C) of rule 1501:13-4-13 of the Administrative Code.
- See Addendum to Page 17, Part 2, B
- (3) For those areas to be affected by underground mining surface operations where removal of the overburden down to the level of the coal seam will occur, submit Attachment 12(s) as required by paragraphs (C) (2) (a) and (c) of rule 1501:13-4-13 of the Administrative Code.
- (4) For those areas within the shadow area where the stratum above the coal seam to be mined will not be removed, submit Attachment 13(s) as required by paragraphs (C) (2) (d) and (e) of rule 1501:13-4-13 of the Administrative Code.

See Attachment 13

C. GROUND WATER INFORMATION-Permit, Shadow Area, and Adjacent Area

- (1) Submit an Attachment 14B which describes the ground water hydrology of the proposed permit area, shadow area, and adjacent area. The Attachment 14B is to include information on each waterbearing stratum or zone as required by paragraph (D) of rule 1501:13-4-13 of the Administrative Code, including the first waterbearing stratum below the coal to be mined.
- See Attachment 14B
- (2) Are there any wells on the proposed permit area, shadow area, and adjacent area? X Yes, No. If "yes," submit Attachment 14C.
- See Attachment 14C
- (3) Are there any springs on the proposed permit area, or developed springs on the shadow area and adjacent area? X Yes, No. If "yes," submit Attachment 14C.
- See Attachment 14C
- (4) Are there any public water supply sources on the proposed permit area, shadow area, and adjacent area? Yes, X No. If "yes," submit Attachment 14A, Attachment 14D, and show location on the hydrology map.
- See Attachment 14D and Hydrology Map
- (5) Submit Attachment 14A for representative wells and developed springs as required by paragraph (D) (4) of rule 1501:13-4-13. Based on this data identify the seasonal variations of ground water quality and quantity.

See Attachment 14A



Addendum to Page 18, C
The Ohio Valley Coal Company
Powhatan No. 6 Mine
Permit D-0360

April 20, 1990

Ohio Department of Natural Resources
Division of Water
Fountain Square
Columbus, Ohio 43224

Dear Sirs:

Enclosed is a map depicting an area of Smith Township, Belmont County, Ohio, that is planned to be mined using longwall mining techniques. Please provide us with a ground water inventory report for this area. The map is a part of the USGS 7½ minute Armstrong Mills Quadrangle.

As this is an essential part of our permitting for the longwall, your prompt consideration in this matter would be greatly appreciated. If you have any questions, please contact me.

Very truly yours,

THE OHIO VALLEY COAL COMPANY

David L. Bartsch, P.E.
Project Engineer

DLB:jlz

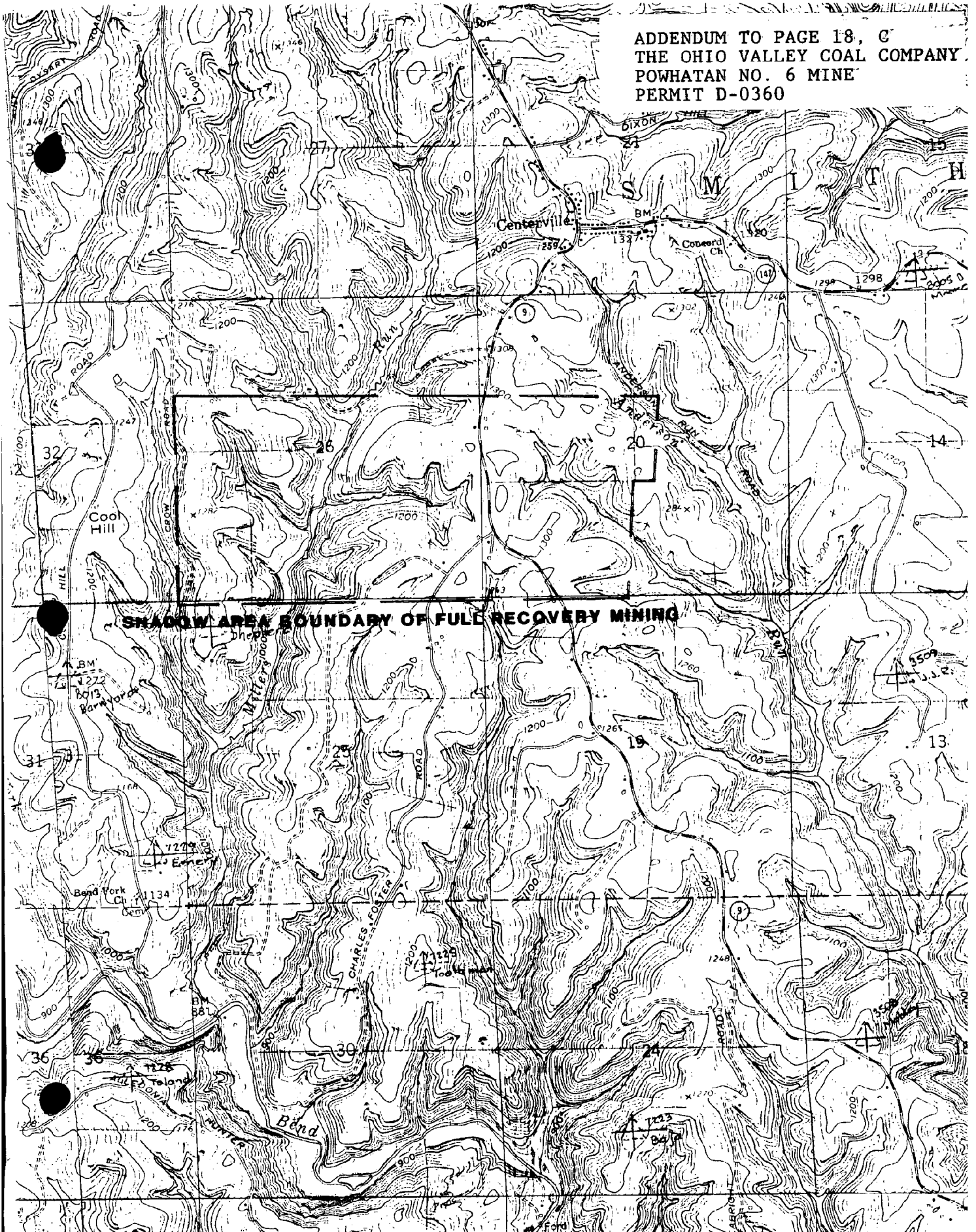
Enclosure

Copies to: J. R. Forrelli
File

56854 PLEASANT RIDGE ROAD • ALLEDONIA OHIO 43902 • (614) 926-1351

TOVCC 15210

ADDENDUM TO PAGE 18, C
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
PERMIT D-0360



ADDENDUM TO PAGE 18, C
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
PERMIT D-0360

log # 233514
185234
402959
686567

ODNR
OHIO DEPARTMENT OF
NATURAL RESOURCES

Date May 30, 1990

Fountain Square
Columbus, Ohio 43224

ANALYSIS OF EXISTING GROUND WATER FILE DATA

Prepared by: Carrie Frederick CF, hydrogeologist
Operator: The Ohio Valley Coal Co. Permit No.
County: Belmont
Township: Smith
Section: 19, 20, 25, 26, 31, 32

Number of water well logs within 1,000 foot radius of site
(copies attached) 4: Field located 2

General description of local hydrology:

Ground water is obtained from alternating sandstone, limestone, and shale bedrock.

Long-term yields are generally less than 3 gpm. The average well depth approximates 80 feet.

Areas of particular concern:

Because the #8 coal seam lies at elevations approximately 300 to 600 feet below surface elevations, dewatering is not likely. However, as a precautionary measure, pre-mining water levels and pumpage data should be collected from all existing wells within 1000 feet of the site.

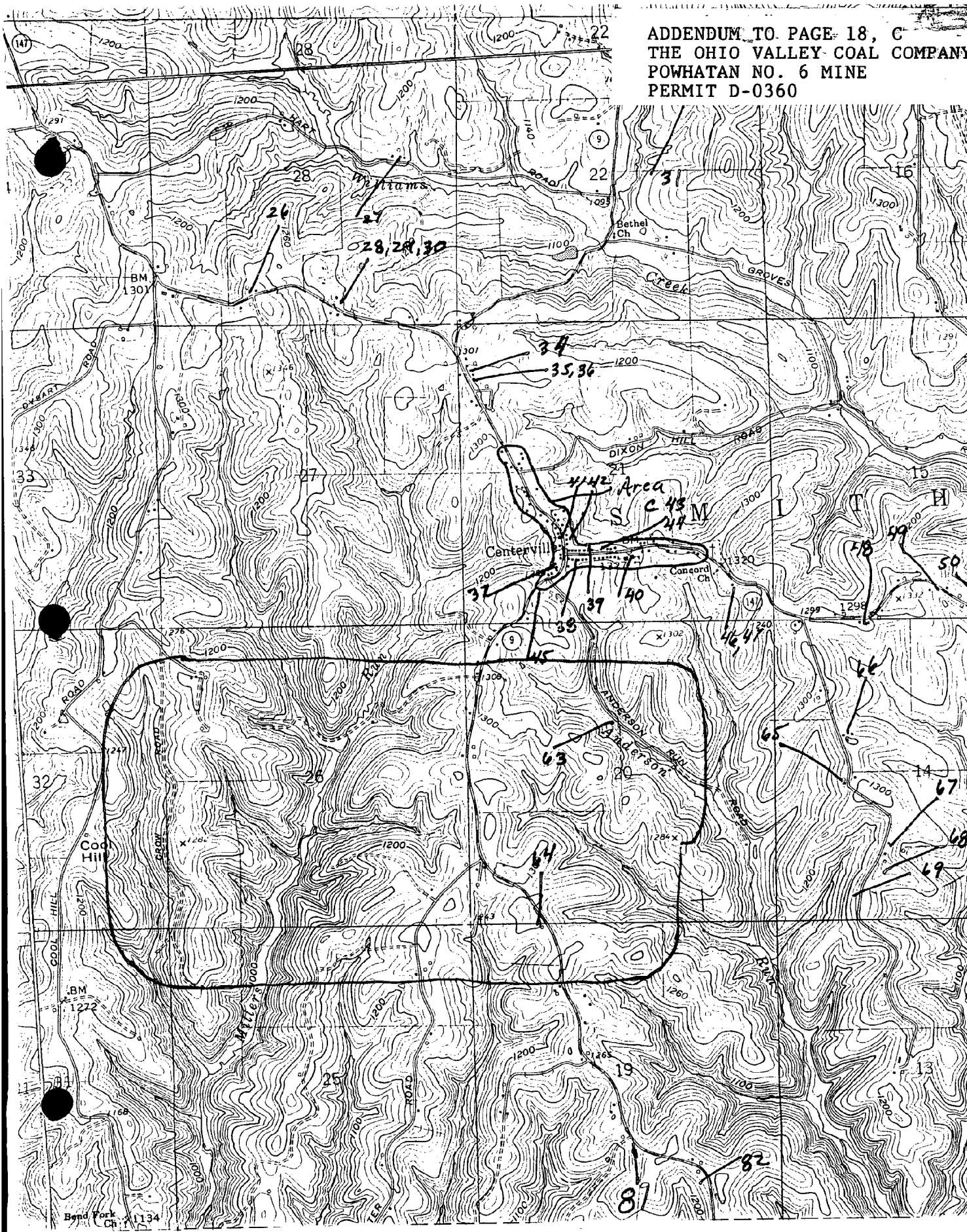
Richard F. Celeste, Governor

TOVCC 15212

ADDENDUM TO PAGE 18, C
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
PERMIT D-0360

SHADOW AREA BOUNDARY OF FULL RECOVERY MINING

ADDENDUM TO PAGE 18, C
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
PERMIT D-0360



WELL LOG AND DRILLING REPORT

ORIGINAL
ADDENDUM TO PAGE 18, C
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
PERMIT D-0360

PLEASE USE PENCIL
OR TYPEWRITER.
DO NOT USE INK.

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
1562 W. First Avenue
Columbus, Ohio

No. 233514

County Belmont Township Smith Section of Township 20
Owner MR. JACK PATTERSON Address JACOBSBURG, OHIO
Location of property 1 MI S CENTER VILL ON TWP ROAD

CONSTRUCTION DETAILS

Casing diameter 6 1/2" Length of casing 20'
Type of screen — Length of screen —
Type of pump JET PUMP
Capacity of pump 450 G.P.H.
Depth of pump setting 80'
Date of completion JULY 20 1959

BAILING OR PUMPING TEST

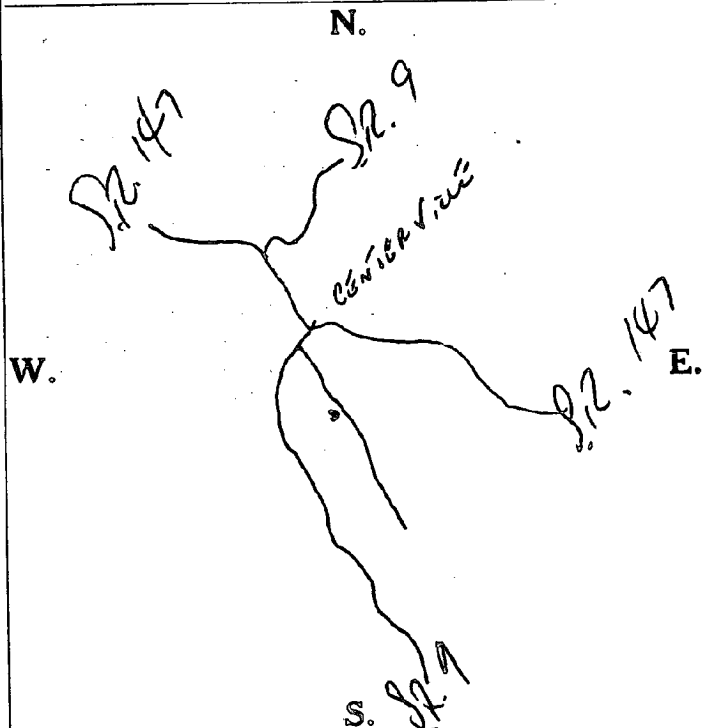
Pumping rate 3 G.P.M. Duration of test — hrs.
Drawdown — ft. Date —
Developed capacity —
Static level—depth to water 40' ft.
Pump installed by PHILLIPS DRILLING CO.

WELL LOG

Formations Sandstone, shale, limestone, gravel and clay	From	To
SURFACE	0 Feet	15 Ft.
SANDSTONE	15	17
SLATE	17	18
	18	19
SANDSTONE	19	23
SHALE	23	40
SANDSTONE	40	45
SLATE	45	60
SHALE	60	71
SANDSTONE	71	72
LIME		
SLATE	72	84

SKETCH SHOWING LOCATION

Locate in reference to numbered
State Highways, St. Intersections, County roads, etc.



See reverse side for instructions

Drilling Firm PHILLIPS DRILLING CO.
JACOBSBURG, OHIO
Address —

Date JULY 1959
Signed Robert W. Phillips

63

WELL LOG AND DRILLING REPORT
 State of Ohio
 DEPARTMENT OF NATURAL RESOURCES
 Division of Water
 1500 Dublin Road
 Columbus, Ohio

ORIGINAL
 ADDENDUM TO PAGE 18, C
 THE OHIO VALLEY COAL COMPANY
 POWHATAN NO. 6 MINE
 PERMIT D-8360
No. 185234

County BELMONT Township SMITH Section of Township 20
 Owner LEO D MCGAUGHY Address ARMSTRONGS MILLS, O
 Location of property 2 M. S. ON RT 9 FROM INT OF 9 AND 947

CONSTRUCTION DETAILS	BAILING OR PUMPING TEST
Casing diameter <u>8"</u> Length of casing <u>17'</u>	Pumping rate <u>10</u> G.P.M. Duration of test.....hrs.
Type of screen..... Length of screen.....	Drawdown.....ft. Date.....
Type of pump <u>MYERS EJECTO</u>	Developed capacity.....
Capacity of pump.....	Static level—depth to water <u>45</u> ft.
Depth of pump setting <u>80</u>	Pump installed by <u>Phillips Drilling Co.</u>
Date of completion <u>JUNE 10 1957</u>	

WELL LOG			SKETCH SHOWING LOCATION
Formations Sandstone, shale, limestone, gravel and clay	From	To	Locate in reference to numbered State Highways, St. Intersections, County roads, etc.
<u>OLD WELL</u>	<u>0 Feet</u>	<u>60 Ft.</u>	N.
<u>SANDSTONE</u>	<u>60</u>	<u>65</u>	<u>SA 147</u>
<u>SLATE</u>	<u>65</u>	<u>68</u>	<u>CENTERVILLE</u>
<u>WATER SANDSTONE</u>	<u>68</u>	<u>71</u>	<u>SA #9</u>
<u>SLATE</u>	<u>71</u>	<u>80</u>	<u>SA 147</u>
<u>SHALE</u>	<u>80</u>	<u>91</u>	W. E.
			S.
			APPROX 2 MILE SOUTH OF INTERSECTION

Drilling Firm Phillips Drilling Co. Date JUNE 11 1957
 Address JACOBSBORO, O Signed [Signature]

WELL LOG AND DRILLING REPORT

ADDENDUM TO PAGE 18.6
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
PERMIT D-0360
No. 402959

NO CARBON PAPER
NECESSARY—

SELF-TRANSCRIBING

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
65 S. Front St., Rm. 815 Phone (614) 469-2646
Columbus, Ohio 43215

County BELMONT Township SMITH Section of Township _____
Owner STANLEY KNOLLINGES Address R.R.#1 JACOBSTOWN
Location of property 2 MILES SOUTH OF CENTERVILLE ON TWP RD. #

CONSTRUCTION DETAILS		BAILING OR PUMPING TEST (Specify one by circling)	
Casing diameter <u>10"</u>	Length of casing <u>21'</u>	Test Rate <u>3</u> G.P.M.	Duration of test _____ hrs.
Type of screen _____	Length of screen _____	Drawdown _____ ft.	Date _____
Type of pump _____		Static level-depth to water <u>24</u> ft.	
Capacity of pump _____		Quality (clear, cloudy, taste, odor) <u>CLEAR</u>	
Depth of pump setting _____			
Date of completion <u>9-7-71</u>		Pump installed by _____	

WELL LOG*			SKETCH SHOWING LOCATION	
Formations Sandstone, shale, limestone, gravel and clay	From	To	Locate in reference to numbered State Highways, St. Intersections, County roads, etc.	
<u>SHALE</u>	<u>0 Feet</u>	<u>5 Ft.</u>		
<u>SANDSTONE</u>	<u>5</u>	<u>30</u>		
<u>GREY SHALE</u>	<u>30</u>	<u>45</u>		
<u>SANDSTONE</u>	<u>45</u>	<u>50</u>		
<u>GREY SHALE</u>	<u>50</u>	<u>65</u>		
<u>WATER AT 28'</u>				

Drilling Firm KRIECHBAUM
Address JACOBSTOWN OHIO

Date 9-9-71
Signed Laverne Kriechbaum

*If additional space is needed to complete well log, use next consecutive numbered form.

WELL LOG AND DRILLING REPORT

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
1939 Fountain Square Drive
Columbus, Ohio 43224

ADDENDUM TO PAGE 18,C
THE OHIO VALLEY COAL CO
POPWATAN NO. 6 MINE

686567

PERMIT D-0360

Permit Number 16

TYPE OR USE PEN
SELF-TRANSCRIBING
PRESS HARD!

COUNTY BELMONT TOWNSHIP SMITH SECTION OF TOWNSHIP 21
OWNER PAUL WILSON PROPERTY ADDRESS 60987 CENTERVILLE
LOCATION OF PROPERTY 1/4 M. S. OF CENTERVILLE ON ROUTE 9

CONSTRUCTION DETAILS

CASING

Casing Diameter 8 in. Length of Casing 27 ft
Type: ☐ Steel ☐ Galv. ☒ PVC ☐ Other
Joints: ☐ Threaded ☐ Welded ☒ Solvent ☐ Other

SCREEN

Type (wire wrapped, louvered, etc.) N/O Material
Length ft Diameter in.
Set between ft and ft Slot

GROUT

Material CEMENT + DRILL MUD Volume used 500 lbs
Method of installation POUR
Depth: placed from 25 ft to SURFACE ft
☐ Rotary ☒ Cable ☐ Augered ☐ Driven ☐ Dug ☐ Other

BAILING OR PUMPING TEST

(specify one by circling)

WELL TEST

Test rate 1 gpm Duration of test 1/2 hrs.
Drawdown (water level during pumping) ft
Measured from: ☒ top of casing ☐ ground level ☐ Other
Static Level (depth to water) 40 ft Date: 6-15-89
Quality (clear, cloudy, taste, odor) CLOUDY

PUMP

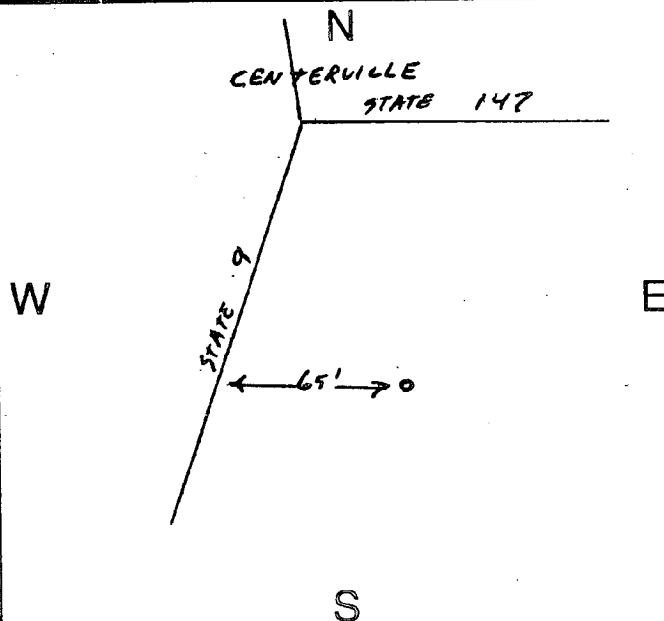
Type of pump 1/2 hp SUB Capacity 12 gpm
Pump set at 86 ft
Pump installed by DAVE GREEN
Pitless Device ☒ Adapter ☐ Preassembled unit
Use of Well SINGLE-FAMILY

WELL LOG*

Show color, texture, hardness, and formation: sandstone, shale, limestone, gravel, clay, sand	From	To
CLAY SOIL	0 ft	2 ft
BROWN SHALE	2	6.5
SAND STONE	6.5	12
LIME STONE	12	22
H ² O 1	22	
SAND STONE	22	30
LIME STONE	30	36
SAND STONE /w CRACKS	36	40
LIME STONE	40	93

SKETCH SHOWING LOCATION

Show distances well lies from numbered
state highways, street intersections, county roads, etc.



* If additional space is needed to complete well log, use next consecutively numbered form.

DNR 7802.88

DRILLING FIRM GREEN'S WELL DRILLING SIGNED David Green
ADDRESS 429 S MAIN ST DATE 6-23-89
CITY, STATE, ZIP BETHESDA, OH 43219 ODH REGISTRATION NUMBER 1572

Completion of this form is required by 1521.05, Ohio Revised Code - file within 30 days after completion of drilling.

ORIGINAL COPY - ODNR, DIVISION OF WATER, 1939 FOUNTAIN SQ. DRIVE, COLS., OHIO 43224

Blue - Customer's Copy Pink - Driller's Copy Green - Local Health Dept. Copy

TOVCC 15218

ADDENDUM TO PAGE 18, C
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
PERMIT D-0360

GROUNDWATER INFORMATION

Naturally occurring groundwater in this area resides primarily in consolidated (rock) aquifers that are partially or wholly confined and lie within the geologic interval above the Pittsburgh No. 8 Coal.

The rock aquifers are primarily sandstones, limestones and coals, but may also include shales and siltstones. All units transmit water primarily by secondary permeability or hydraulic conductivity (joints and other fractures, bedding partings). In general, primary permeabilities are low to very low for these materials. These aquifers are recharged through infiltration and percolation at outcrop zones and in some cases, by vertical flows through discontinuities and locally permeable overlying strata. The stratigraphy identified in the Addendum to Page 17, Part 2, B, Geology Description, shows numerous lithologic units that are probably capable of transmitting water. However, confining pressures tend to keep lower strata rock discontinuities closed or "tight" so that useful aquifers tend to lie close to the ground surface. Wells penetrating near surface rock aquifers typically exhibit yields of less than one half gallon per minute.

Numerous aquicludes comprised of claystones, mudstones, underclays, limestones with clay lenses, and some shales and siltstones are interbedded with the more permeable water bearing units. These less permeable strata strongly influence horizontal and vertical water movements. A portion of the springs flowing from valley walls below the ridgelines probably derive from rock aquifers and many can probably be identified as adjacent to the less permeable strata.

Groundwater quality data obtained from these rock aquifer springs and the wells generally indicate pH ranges from 6.48 to 9.40, alkalinities in excess of acidities, high hardness, and low metals concentrations.

Wells and springs located on the permit area are identified on the Attachment 14 forms included with this application.

EXCERPT FROM R-0360-1
Page 12, C(1)
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE

GROUNDWATER INFORMATION

Naturally occurring groundwater in the permit area resides primarily in consolidated (rock) aquifers that are partially or wholly confined and lie within the geologic interval above the Pittsburgh No. 8 Coal.

The rock aquifers are primarily sandstones, limestones and coals, but may also include shales and siltstones. All units transmit water primarily by secondary permeability or hydraulic conductivity (joints and other fractures, bedding partings). In general, primary permeabilities are low to very low for these materials. These aquifers are recharged through infiltration and percolation at outcrop zones and in some cases, by vertical flows through discontinuities and locally permeable overlying strata. The stratigraphy identified on page 12, B(1) Geology Description, shows numerous lithologic units that are probably capable of transmitting water. However, confining pressures tend to keep lower strata rock discontinuities closed or 'tight' so that useful aquifers tend to lie no more than 150 to 200 feet below the ground surface. The Division of Water relates that water below 250 feet below the surface tends to be brackish. Wells penetrating near-surface rock aquifers typically exhibit yields of less than one-half gallon per minute.

Numerous aquicludes comprised of claystones, mudstones, underclays, limestones with clay lenses, and some shales and siltstones are interbedded with the more permeable water bearing units. These less permeable strata strongly influence horizontal and vertical water movement. A portion of the springs flowing from valley walls below the ridgelines probably derive from rock aquifers and many can probably be identified as adjacent to the less permeable strata. The water bearing units and aquicludes occur at various elevations throughout the adjacent area.

**OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION**

**ATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)**

Applicant's Name THE OHIO VALLEY COAL COMPANY

1.	Identification No. of Sampling Station from Hydrology Map	W-46	W-46	W-43	W-43	SP-29	SP-30
2.	Lab Identification Number	8910391		10/31/89	9002168	9009716	9009717
3.	High (H)/Low (L) Designation (if applicable)	L	H	L	H	L	L
4.	Surface Elevation for Sampling Station (msl)	1286	1286	1263	1263	1265	1266
5.	Depth of Well below Land Surface (feet)	Note 1	Note 1	Note 1	Note 1	-	-
6.	Static Water Level of Well below Land Surface (feet)	Note 1	Note 1	Note 1	Note 1	-	-
7.	Flow for Spring/Stream (gpm or cfs)	-	-	-	-	1.25gpm	1.0gpm
8.	Date Above Measurements Made	10/31/89		10/31/89	2/6/90	9/10/90	9/10/90
9.	Aquifer/Zone Identification for Well/Spring	Note 1	Note 3	Note 1	Note 1	L-2	L-2
10.	pH (Standard Units)	7.51		7.16	7.12	6.40	6.74
11.	Total Acidity (mg/l CaCO ₃)	13.1		23.2	18.1	36.4	61.4
12.	Total Alkalinity (mg/l CaCO ₃)	205		170	161	89.7	100.5
13.	Specific Conductivity (umhos/cm at 25°C)	790		740	675	864	855
14.	Total Dissolved Solids (mg/l)	370		234	422	-	-
15.	Total Manganese (mg/l)	<0.02		0.08	0.15	0.14	0.18
16.	Total Sulfates (mg/l)	62.7		92.0	42.4	71.0	97.0
17.	Total Iron (mg/l)	0.01		13.0	8.90	1.30	0.85
18.	Total Suspended Solids (mg/l)	<1.0		44.5	35.1	18	12
19.	Total Hardness (mg/l as CaCO ₃)	331		280	303	224	217
20.	Date Sampled for Analysis	10/31/89		10/31/89	2/6/90	9/10/90	9/10/90
21.	Date Last Precipitation Event Occurred	10/31/89		10/31/89	2/4/90	9/9/90	9/9/90
22.	Nitrates	3.89		2.70	3.29	1.98	2.24

Laboratory Name Tradet, Inc.

Address P.O. Box 2019

State West Virginia

City Wheeling

zip 26003

NOTE: If information required by items 5, 6, and 9 is unobtainable, submit as an addendum to Attachment 14A a statement giving the reasons why the information is unobtainable.

NOTE: For each sample provide data for either item 13 or item 14.

OHIO DEPARTMENT OF NATURAL RESOURCES
 DIVISION OF RECLAMATION

 ATTACHMENT 14A
 (HYDROLOGIC MEASUREMENTS AND ANALYSES)

 Applicant's Name THE OHIO VALLEY COAL COMPANY

1.	Identification No. of Sampling Station from Hydrology Map	P-1	P-1	P-1	P-1	P-1	P-1
2.	Lab Identification Number	8902286	8903407	8904256	8905400	8906375	8907078
3.	High (H)/Low (L) Designation (if applicable)	-	-	-	-	-	-
4.	Surface Elevation for Sampling Station (msl)	1190	1190	1190	1190	1190	1190
5.	Depth of Well below Land Surface (feet)	-	-	-	-	-	-
6.	Static Water Level of Well below Land Surface (feet)	-	-	-	-	-	-
7.	Flow for Spring/Stream (gpm or cfs)	12.1gpm	13.7gpm	14.9gpm	13.3gpm	10.1gpm	8.6gpm
8.	Date Above Measurements Made	2/22/89	3/28/89	4/20/89	5/24/89	6/19/89	7/6/89
9.	Aquifer/Zone Identification for Well/Spring	-	-	-	-	-	-
10.	pH (Standard Units)	7.37	7.29	7.45	7.26	7.46	7.13
11.	Total Acidity (mg/l CaCO ₃)	3.4	3.07	3.4	1.8	0.0	3.4
12.	Total Alkalinity (mg/l CaCO ₃)	28.0	4.40	55.0	53.0	107	64.0
13.	Specific Conductivity (umhos/cm at 25°C)	180	210	162	221	270	237
14.	Total Dissolved Solids (mg/l)	99.0	84.0	73.0	88.0	121	116
15.	Total Manganese (mg/l)	0.06	0.04	0.06	0.13	0.13	0.13
16.	Total Sulfates (mg/l)	43.0	50.0	46.4	44.0	37.9	40.00
17.	Total Iron (mg/l)	0.27	0.14	0.35	0.72	0.23	0.26
18.	Total Suspended Solids (mg/l)	3.6	2.0	9.0	<1.0	<1.0	8.4
19.	Total Hardness (mg/l as CaCO ₃)	76.0	45.0	10.0	34.0	11.3	52.5
20.	Date Sampled for Analysis	2/22/89	3/28/89	4/20/89	5/24/89	6/19/89	7/6/89
21.	Date Last Precipitation Event Occurred	2/20/89	3/28/89	4/18/89	5/23/89	6/19/89	7/4/89
22.	Nitrates						

 Laboratory Name Tradet, Inc.

 Address P.O. Box 2019

 State West Virginia

 City Wheeling

 Zip 26003

NOTE: If information required by items 5, 6, and 9 is unobtainable, submit as an addendum to Attachment 14A a statement giving the reasons why the information is unobtainable.

NOTE: For each sample provide data for either item 13 or item 14.

**OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION**

**ATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)**

Applicant's Name THE OHIO VALLEY COAL COMPANY

1.	Identification No. of Sampling Station from Hydrology Map	SP-26	SP-26	SP-27	SP-27	SP-28	SP-28
2.	Lab Identification Number	9002184	892108	9002182	892105	9002183	892106
3.	High (H)/Low (L) Designation (if applicable)	H	L	H	L	H	L
4.	Surface Elevation for Sampling Station (msl)	1230	1230	1200	1200	1200	1200
5.	Depth of Well below Land Surface (feet)	-	-	-	-	-	-
6.	Static Water Level of Well below Land Surface (feet)	-	-	-	-	-	-
7.	Flow for Spring/Stream (gpm or cfs)	.88gpm	.53gpm	2.9gpm	1.0gpm	.88gpm	.53gpm
8.	Date Above Measurements Made	2/7/90	12/5/89	2/7/90	12/5/89	2/7/90	12/5/89
9.	Aquifer/Zone Identification for Well/Spring	L-5	L-5	L-3	L-3	L-3	L-3
10.	pH (Standard Units)	6.95	7.39	6.61	7.05	6.80	7.03
11.	Total Acidity (mg/l CaCO ₃)	16.3	15.5	26.1	20.0	24.3	16.3
12.	Total Alkalinity (mg/l CaCO ₃)	101	144	62.4	123	168	205
13.	Specific Conductivity (umhos/cm at 25°C)	340	540	630	750	1010	1410
14.	Total Dissolved Solids (mg/l)	224	316	396	429	657	711
15.	Total Manganese (mg/l)	0.08	0.08	0.06	0.05	0.06	0.04
16.	Total Sulfates (mg/l)	49.6	30.4	96.0	73.3	100	181
17.	Total Iron (mg/l)	1.09	1.57	0.09	0.11	0.26	0.12
18.	Total Suspended Solids (mg/l)	29.9	83.7	3.5	4.5	7.5	4.1
19.	Total Hardness (mg/l as CaCO ₃)	107	201	192	250	438	404
20.	Date Sampled for Analysis	2/7/90	12/5/89	2/7/90	12/5/89	2/7/90	12/5/89
21.	Date Last Precipitation Event Occurred	2/4/90	12/3/89	2/4/90	12/3/89	2/4/90	12/3/89
22.	Nitrates	2.68	3.44	3.29	2.82	3.06	3.33

Laboratory Name Tradet, Inc.

Address P.O. Box 2019

State West Virginia

City Wheeling

Zip 26003

NOTE: If information required by items 5, 6, and 9 is unobtainable, submit as an addendum to Attachment 14A a statement giving the reasons why the information is unobtainable.

NOTE: For each sample provide data for either item 13 or item 14.

OHIO DEPARTMENT OF NATURAL RESOURCES
 DIVISION OF RECLAMATION

 ATTACHMENT 14A
 (HYDROLOGIC MEASUREMENTS AND ANALYSES)

 Applicant's Name THE OHIO VALLEY COAL COMPANY

1.	Identification No. of Sampling Station from Hydrology Map	W-44	W-44				
2.	Lab Identification Number	8910393	9002167				
3.	High (H)/Low (L) Designation (if applicable)	L	H				
4.	Surface Elevation for Sampling Station (msl)	1297	1297				
☆ 5.	Depth of Well below Land Surface (feet)	Note 1	Note 1				
☆ 6.	Static Water Level of Well below Land Surface (feet)	Note 1	Note 1				
7.	Flow for Spring/Stream (gpm or cfs)	-	-				
8.	Date Above Measurements Made	10/31/89	2/6/90				
☆ 9.	Aquifer/Zone Identification for Well/Spring	Note 1	Note 1				
10.	pH (Standard Units)	7.31	7.18				
11.	Total Acidity (mg/l CaCO ₃)	24.9	21.7				
12.	Total Alkalinity (mg/l CaCO ₃)	364	364				
13.	Specific Conductivity (umhos/cm at 25°C)	740	675				
☆☆ 14.	Total Dissolved Solids (mg/l)	363	410				
15.	Total Manganese (mg/l)	<0.02	0.04				
16.	Total Sulfates (mg/l)	101	33.6				
17.	Total Iron (mg/l)	0.07	0.07				
18.	Total Suspended Solids (mg/l)	1.7	<1.0				
19.	Total Hardness (mg/l as CaCO ₃)	337	353				
20.	Date Sampled for Analysis	10/31/89	2/6/90				
21.	Date Last Precipitation Event Occurred	10/31/89	2/4/90				
22.	Nitrates	0.35	0.54				

 Laboratory Name Trader, Inc.

 Address P.O. Box 2019

 State West Virginia

 City Wheeling

 Zip 26003

NOTE: If information required by items 5, 6, and 9 is unobtainable, submit as an addendum to Attachment 14A a statement giving the reasons why the information is unobtainable.

NOTE: For each sample provide data for either item 13 or item 14.

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATIONATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)Applicant's Name THE OHIO VALLEY COAL COMPANY

1.	Identification No. of Sampling Station from Hydrology Map	W-34	W-34	SP-23	SP-23	SP-24	SP-24
2.	Lab Identification Number	89101598	89070648	89070628	8910157	89070638	8910158
3.	High (H)/Low (L) Designation (if applicable)	L	H	H	L	H	L
4.	Surface Elevation for Sampling Station (msl)	1272	1272	1251	1251	1257	1257
5.	Depth of Well below Land Surface (feet)	26'	Note 1	-	-	-	-
6.	Static Water Level of Well below Land Surface (feet)	11'	Note 1	-	-	-	-
7.	Flow for Spring/Stream (gpm or cfs)	-	-	2gpm	1.5gpm	2gpm	1.5gpm
8.	Date Above Measurements Made	10/12/89	7/6/89	7/6/89	10/12/89	7/6/89	10/12/89
9.	Aquifer/Zone Identification for Well/Spring	L-7	L-7	L-6	L-6	L-6	L-6
10.	pH (Standard Units)	9.4	8.35	6.57	6.69	6.48	6.71
11.	Total Acidity (mg/l CaCO ₃)	0.0	0.0	64.0	28.6	97.0	20.3
12.	Total Alkalinity (mg/l CaCO ₃)	64.6	115	92.0	103	95.0	115
13.	Specific Conductivity (umhos/cm at 25°C)	570	713	1230	1190	811	920
14.	Total Dissolved Solids (mg/l)	294	448	681	615	447	477
15.	Total Manganese (mg/l)	<0.02	<0.02	0.06	0.07	0.04	0.04
16.	Total Sulfates (mg/l)	141	148	80.0	101	50.0	72.0
17.	Total Iron (mg/l)	<0.02	<0.02	0.41	0.14	0.06	0.03
18.	Total Suspended Solids (mg/l)	2.5	5.1	19.8	3.7	4.4	<1.0
19.	Total Hardness (mg/l as CaCO ₃)	121	145	295	356	140	240
20.	Date Sampled for Analysis	10/12/89	7/6/89	7/6/89	10/12/89	7/6/89	10/12/89
21.	Date Last Precipitation Event Occurred	10/10/89	7/4/89	7/4/89	10/12/89	7/4/89	10/10/89
22.	Nitrates	-	-	-	-	-	-

Laboratory Name Trader, Inc.Address P.O. Box 2019State West VirginiaCity Wheelingzip 26003

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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATIONATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)Applicant's Name THE OHIO VALLEY COAL COMPANY

1.	Identification No. of Sampling Station from Hydrology Map	W-45	W-45	W-48	W-48	SP-25	SP-25
2.	Lab Identification Number	90002170	89121048	912103	9002169	9002181	8912107
3.	High (H)/Low (L) Designation (if applicable)	H	L	L	H	H	L
4.	Surface Elevation for Sampling Station (msl)	1273	1273	1270	1270	1240	1240
5.	Depth of Well below Land Surface (feet)	Note 1	Note 1	35'	35'	-	-
6.	Static Water Level of Well below Land Surface (feet)	Note 1	Note 1	8'	10'	-	-
7.	Flow for Spring/Stream (gpm or cfs)	-	-	-	-	125gpm	.89gpm
8.	Date Above Measurements Made	2/6/90	12/5/89	12/5/89	2/6/90	2/7/90	12/5/89
9.	Aquifer/Zone Identification for Well/Spring	Note 1	Note 1	L-5	L-5	L-6	L-6
10.	pH (Standard Units)	7.04	7.07	6.96	6.98	6.87	7.71
11.	Total Acidity (mg/l CaCO ₃)	14.7	5.3	11.1	23.5	26.7	0.0
12.	Total Alkalinity (mg/l CaCO ₃)	198	198	189	118	103	146
13.	Specific Conductivity (umhos/cm at 25°C)	1040	970	1410	1040	390	570
14.	Total Dissolved Solids (mg/l)	560	571	866	668	273	321
15.	Total Manganese (mg/l)	0.08	0.08	0.08	0.11	0.06	0.05
16.	Total Sulfates (mg/l)	45.6	61.3	240	133	48.0	41.6
17.	Total Iron (mg/l)	0.05	0.22	1.29	1.74	0.04	0.11
18.	Total Suspended Solids (mg/l)	8.7	18.1	31.7	35.9	<1.0	6.1
19.	Total Hardness (mg/l as CaCO ₃)	461	445	282	271	166	225
20.	Date Sampled for Analysis	2/6/90	12/5/89	12/5/89	2/6/90	2/7/90	12/5/89
21.	Date Last Precipitation Event Occurred	2/4/90	12/3/89	12/3/89	2/4/90	2/4/90	12/3/89
22.	Nitrates	1.35	0.43	3.41	4.25	3.71	2.30

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OHIO DEPARTMENT OF NATURAL RESOURCES
 DIVISION OF RECLAMATION

 ATTACHMENT 14A
 (HYDROLOGIC MEASUREMENTS AND ANALYSES)

 Applicant's Name The Ohio Valley Coal Company

1.	Identification No. of Sampling Station from Hydrology Map	W-27	W-27	W-27	W-27	W-27	W-27
2.	Lab Identification Number	8902369	8903416	8904374	8905415	8906423	8907195
3.	High (H)/Low (L) Designation (if applicable)	--	--	--	--	--	--
4.	Surface Elevation for Sampling Station (msl)	1283	1283	1283	1283	1283	1283
5.	Depth of Well below Land Surface (feet)	90	90	90	90	90	90
6.	Static Water Level of Well below Land Surface (feet)	32	32	31	31	30	30
7.	Flow for Spring/Stream (gpm or cfs)	--	--	--	--	--	--
8.	Date Above Measurements Made	2/27/89	3/29/89	4/21/89	5/17/89	6/20/89	7/6/89
9.	Aquifer/Zone Identification for Well/Spring	L-6	L-6	L-6	L-6	L-6	L-6
10.	pH (Standard Units)	7.46	7.42	8.10	7.37	7.39	7.53
11.	Total Acidity (mg/l CaCO ₃)	11.4	8.76	22.3	10.8	22.2	10.0
12.	Total Alkalinity (mg/l CaCO ₃)	169	160	162	170	165	167
13.	Specific Conductivity (umhos/cm at 25°C)	740	740	984	828	1100	900
14.	Total Dissolved Solids (mg/l)	383	471	705	608	644	490
15.	Total Manganese (mg/l)	0.03	0.02	0.04	<0.02	0.14	0.05
16.	Total Sulfates (mg/l)	42.0	52.0	41.6	44.8	40.8	35.0
17.	Total Iron (mg/l)	0.07	0.07	0.12	0.08	0.12	0.05
18.	Total Suspended Solids (mg/l)	<1.0	<1.0	<1.0	<1.0	6.3	5.1
19.	Total Hardness (mg/l as CaCO ₃)	368	422	391	317	442	345
20.	Date Sampled for Analysis	2/27/89	3/29/89	4/21/89	5/17/89	6/20/89	7/6/89
21.	Date Last Precipitation Event Occurred	2/26/89	3/29/89	4/18/89	5/13/89	6/20/89	7/4/89

 Laboratory Name Tra-Det, Inc.

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**OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION**

**ATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)**

Applicant's Name The Ohio Valley Coal Company

1.	Identification No. of Sampling Station from Hydrology Map	W-28	W-28	W-28	W-28	W-28	W-28
2.	Lab Identification Number	8902370	8903415	8905126	8905445	8906373	
3.	High (H)/Low (L) Designation (if applicable)	--	--	--	--	--	--
4.	Surface Elevation for Sampling Station (msl)	1299	1299	1299	1299	1299	1299
* 5.	Depth of Well below Land Surface (feet)	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
* 6.	Static Water Level of Well below Land Surface (feet)	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
7.	Flow for Spring/Stream (gpm or cfs)	--	--	--	--	--	--
8.	Date Above Measurements Made	2/27/89	3/29/89	4/20/89	5/24/89	6/19/89	
* 9.	Aquifer/Zone Identification for Well/Spring	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
10.	pH (Standard Units)	7.45	7.36	7.22	7.08	7.27	Note 2
11.	Total Acidity (mg/l CaCO ₃)	28.8	13.4	24.2	17.2	27.2	
12.	Total Alkalinity (mg/l CaCO ₃)	266	267	257	272	275	
* 13.	Specific Conductivity (umhos/cm at 25°C)	720	770	740	840	790	
** 14.	Total Dissolved Solids (mg/l)	432	464	441	<10	462	
15.	Total Manganese (mg/l)	<0.02	<0.02	<0.02	0.03	<0.02	
16.	Total Sulfates (mg/l)	74.0	76.0	92.0	70.4	66.7	
17.	Total Iron (mg/l)	0.08	0.11	0.26	0.27	0.10	
18.	Total Suspended Solids (mg/l)	<1.0	2.0	<1.0	4.8	2.1	
19.	Total Hardness (mg/l as CaCO ₃)	376	432	345	336	395	
20.	Date Sampled for Analysis	2/27/89	3/29/89	4/20/89	5/24/89	6/19/89	
21.	Date Last Precipitation Event Occurred	2/26/89	3/19/89	4/18/89	5/23/89	6/19/89	

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**OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION**

**ATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)**

Applicant's Name

The Ohio Valley Coal Company

1.	Identification No. of Sampling Station from Hydrology Map	W-24	W-24	W-24	W-24	W-24	W-24
2.	Lab Identification Number	8902257	8903406	8904258	8905401	8906379	8907075
3.	High (H)/Low (L) Designation (if applicable)	--	--	--	--	--	--
4.	Surface Elevation for Sampling Station (msl)	1266	1266	1266	1266	1266	1266
5.	Depth of Well below Land Surface (feet)	77	77	77	77	77	77
6.	Static Water Level of Well below Land Surface (feet)	48	47	47	46	46	46
7.	Flow for Spring/Stream (gpm or cfs)	--	--	--	--	--	--
8.	Date Above Measurements Made	2/21/89	3/28/89	4/20/89	5/24/89	6/19/89	7/6/89
9.	Aquifer/Zone Identification for Well/Spring	L-4	L-4	L-4	L-4	L-4	L-4
10.	pH (Standard Units)	7.04	7.26	7.10	6.87	7.46	7.45
11.	Total Acidity (mg/l CaCO_3)	10.4	7.88	12.6	18.6	10.4	6.8
12.	Total Alkalinity (mg/l CaCO_3)	76.0	80.9	109	102	148	150
13.	Specific Conductivity (umhos/cm at 25°C)	340	350	279	368	430	147
14.	Total Dissolved Solids (mg/l)	166	157	169	213	219	202
15.	Total Manganese (mg/l)	0.04	0.02	0.01	0.03	<0.02	<0.02
16.	Total Sulfates (mg/l)	64.0	77.0	74.4	78.4	38.4	28.0
17.	Total Iron (mg/l)	0.15	0.09	0.29	0.10	<0.02	<0.02
18.	Total Suspended Solids (mg/l)	3.6	<1.0	9.0	<1.0	1.30	1.8
19.	Total Hardness (mg/l as CaCO_3)	168	129	50.0	62.0	70	90
20.	Date Sampled for Analysis	2/21/89	3/28/89	4/20/89	5/24/89	6/19/89	7/6/89
21.	Date Last Precipitation Event Occurred	2/21/89	3/28/89	4/18/89	5/23/89	6/13/89	7/4/89

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**ATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)**

Applicant's Name The Ohio Valley Coal Company

1.	Identification No. of Sampling Station from Hydrology Map	W-25	W-25	W-25	W-25	W-25	W-25
2.	Lab Identification Number	8902252	8903409	8904254	8905398	8906374	8907077
3.	High (H)/Low (L) Designation (if applicable)	--	--	--	--	--	--
4.	Surface Elevation for Sampling Station (msl)	1272	1272	1272	1272	1272	1272
☆ 5.	Depth of Well below Land Surface (feet)	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
☆ 6.	Static Water Level of Well below Land Surface (feet)	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
7.	Flow for Spring/Stream (gpm or cfs)	--	--	--	--	--	--
8.	Date Above Measurements Made	2/21/89	3/28/89	4/20/89	5/24/89	6/19/89	7/6/89
☆ 9.	Aquifer/Zone Identification for Well/Spring	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
10.	pH (Standard Units)	7.48	7.45	7.55	7.19	7.30	7.27
11.	Total Acidity (mg/l CaCO ₃)	13.2	5.84	7.60	9.2	12	16.0
12.	Total Alkalinity (mg/l CaCO ₃)	158	140	177	155	108	106
13.	Specific Conductivity (umhos/cm at 25°C)	380	340	256	399	410	396
** 14.	Total Dissolved Solids (mg/l)	233	146	151	184	236	217
15.	Total Manganese (mg/l)	0.02	<0.02	<0.02	<0.02	0.03	0.05
16.	Total Sulfates (mg/l)	31.0	35.0	36.8	32.0	74.4	67.0
17.	Total Iron (mg/l)	0.04	0.03	0.04	0.45	0.38	0.06
18.	Total Suspended Solids (mg/l)	<1.0	<1.0	5.0	<1.0	<1.0	<1.0
19.	Total Hardness (mg/l as CaCO ₃)	188	124	79.0	58.0	85	75.0
20.	Date Sampled for Analysis	2/21/89	3/28/89	4/20/89	5/24/89	6/19/89	7/6/89
21.	Date Last Precipitation Event Occurred	2/21/89	3/28/89	4/18/89	5/23/89	6/19/89	7/4/89

Laboratory Name Tra-Det. Inc.

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**ATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)**

Applicant's Name

The Ohio Valley Coal Company

1.	Identification No. of Sampling Station from Hydrology Map	W-26	W-26	W-26	W-26	W-26	W-26
2.	Lab Identification Number	8902254	8903417	8904255	8905397	8906378	8907079
3.	High (H)/Low (L) Designation (if applicable)	--	--	--	--	--	--
4.	Surface Elevation for Sampling Station (msl)	1297	1297	1297	1297	1297	1297
5.	Depth of Well below Land Surface (feet)	80	80	80	80	80	80
6.	Static Water Level of Well below Land Surface (feet)	Note 2	41	45	42	44	43
7.	Flow for Spring/Stream (gpm or cfs)	--	--	--	--	--	--
8.	Date Above Measurements Made	2/21/89	3/29/89	4/20/89	5/24/89	6/19/89	7/6/89
9.	Aquifer/Zone Identification for Well/Spring	L-6	L-6	L-6	L-6	L-6	L-6
10.	pH (Standard Units)	7.25	7.26	7.32	6.98	7.22	7.13
11.	Total Acidity (mg/l CaCO ₃)	12.4	12.1	15.0	24.2	24.4	23.0
12.	Total Alkalinity (mg/l CaCO ₃)	167	177	216	205	204	195
13.	Specific Conductivity (umhos/cm at 25°C)	500	530	434	654	650	615
14.	Total Dissolved Solids (mg/l)	312	255	274	328	317	343
15.	Total Manganese (mg/l)	0.02	<0.02	<0.02	0.02	<0.02	0.02
16.	Total Sulfates (mg/l)	69.0	75.0	68.8	74.4	65.3	82.0
17.	Total Iron (mg/l)	0.20	0.07	0.08	0.71	0.07	0.03
18.	Total Suspended Solids (mg/l)	4.0	<1.0	2.0	<1.0	3.3	3.8
19.	Total Hardness (mg/l as CaCO ₃)	280	263	193	211	220	255
20.	Date Sampled for Analysis	2/21/89	3/29/89	4/20/89	5/24/89	6/19/89	7/6/89
21.	Date Last Precipitation Event Occurred	2/21/89	3/29/89	4/18/89	5/23/89	6/19/89	7/4/89

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(HYDROLOGIC MEASUREMENTS AND ANALYSES)**

Applicant's Name

The Ohio Valley Coal Company

1.	Identification No. of Sampling Station from Hydrology Map	SP-21	SP-21	SP-21	SP-21	SP-21	SP-21
2.	Lab Identification Number	8902238	8903398	8904248	8905405	8906385	8907068
3.	High (H)/Low (L) Designation (if applicable)	--	--	--	--	--	--
4.	Surface Elevation for Sampling Station (msl)	1164	1164	1164	1164	1164	1164
☆ 5.	Depth of Well below Land Surface (feet)	--	--	--	--	--	--
☆ 6.	Static Water Level of Well below Land Surface (feet)	--	--	--	--	--	--
7.	Flow for Spring/Stream (gpm or cfs)	2	2	2	2	2	2
8.	Date Above Measurements Made	2/20/89	3/28/89	4/20/89	5/24/89	6/19/89	7/6/89
☆ 9.	Aquifer/Zone Identification for Well/Spring	L-2	L-2	L-2	L-2	L-2	L-2
10.	pH (Standard Units)	7.34	7.36	7.28	7.12	7.10	6.79
11.	Total Acidity (mg/l CaCO ₃)	12.8	10.8	14.0	24.8	33.0	40.0
12.	Total Alkalinity (mg/l CaCO ₃)	172	157	142	171	162	174
13.	Specific Conductivity (umhos/cm at 25°C)	400	325	256	378	420	452
☆☆ 14.	Total Dissolved Solids (mg/l)	199	157	190	197	207	245
15.	Total Manganese (mg/l)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
16.	Total Sulfates (mg/l)	34.0	37.6	36.8	34.4	38.4	36.0
17.	Total Iron (mg/l)	0.04	0.05	0.09	0.08	0.03	0.08
18.	Total Suspended Solids (mg/l)	2.7	2.8	6.0	<1.0	4.5	4.4
19.	Total Hardness (mg/l as CaCO ₃)	212	174	69.0	72.0	90	145
20.	Date Sampled for Analysis	2/20/89	3/28/89	4/20/89	5/24/89	6/19/89	7/6/89
21.	Date Last Precipitation Event Occurred	2/20/89	3/28/89	4/18/89	5/23/89	6/19/89	7/4/89

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 ATTACHMENT 14A
 (HYDROLOGIC MEASUREMENTS AND ANALYSES)

 Applicant's Name THE OHIO VALLEY COAL COMPANY

1.	Identification No. of Sampling Station from Hydrology Map	U21-E	U21-E	U21-F	U21-F	U21-G	U21-G
2.	Lab Identification Number	8911024	9006401	8911025	9006402	8911031	9002179
3.	High (H)/Low (L) Designation (if applicable)	L	H	L	H	L	H
4.	Surface Elevation for Sampling Station (msl)	1028	1028	1045	1045	1095	1095
5.	Depth of Well below Land Surface (feet)	-	-	-	-	-	-
6.	Static Water Level of Well below Land Surface (feet)	-	-	-	-	-	-
7.	Flow for Spring/Stream (gpm or cfs)	2.1gpm	.90cfs	4.8gpm	.21cfs	3.0gpm	7.5gpm
8.	Date Above Measurements Made	10/31/89	6/26/90	10/31/89	6/26/90	10/31/89	2/6/90
9.	Aquifer/Zone Identification for Well/Spring	-	-	-	-	-	-
10.	pH (Standard Units)	8.42	7.9	8.57	8.00	8.58	7.73
11.	Total Acidity (mg/l CaCO ₃)	0.0	5.1	0.0		0.0	3.0
12.	Total Alkalinity (mg/l CaCO ₃)	130	46.1	130	25.5	133	103
13.	Specific Conductivity (umhos/cm at 25°C)	270	820	270	263	280	245
14.	Total Dissolved Solids (mg/l)	226	-	212	-	219	175
15.	Total Manganese (mg/l)	<0.02	0.03	<0.02	0.04	<0.02	0.05
16.	Total Sulfates (mg/l)	88.0	191	85.3	163	88.0	40.0
17.	Total Iron (mg/l)	0.22	0.20	0.05	1.03	0.07	0.07
18.	Total Suspended Solids (mg/l)	27.6	8.0	4.1	4.0	1.7	3.1
19.	Total Hardness (mg/l as CaCO ₃)	144	139	138	203	135	86.6
20.	Date Sampled for Analysis	10/31/89	6/26/90	10/31/89	6/26/90	10/31/89	2/6/90
21.	Date Last Precipitation Event Occurred	10/31/89	6/24/90	10/31/89	6/24/90	10/31/89	2/4/90
22.	Nitrates	<0.1	1.46	<0.1	1.80	<0.1	<0.10

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 (HYDROLOGIC MEASUREMENTS AND ANALYSES)

 Applicant's Name THE OHIO VALLEY COAL COMPANY

1.	Identification No. of Sampling Station from Hydrology Map	U21-B	U21-B	U21-C	U21-C	U21-D	U21-D
2.	Lab Identification Number	8911021	9009712	8911022	9006411	8911023	9006400
3.	High (H)/Low (L) Designation (if applicable)	L	H	L	H	L	H
4.	Surface Elevation for Sampling Station (msl)	1190	1190	1155	1155	1034	1034
5.	Depth of Well below Land Surface (feet)	-	-	-	-	-	-
6.	Static Water Level of Well below Land Surface (feet)	-	-	-	-	-	-
7.	Flow for Spring/Stream (gpm or cfs)	1.9 gpm	0.2cfs	2.6 gpm	.45cfs	3.0 gpm	3.17cfs
8.	Date Above Measurements Made	10/31/89	9/21/90	10/31/89	6/26/90	10/31/89	6/15/90
9.	Aquifer/Zone Identification for Well/Spring	-	-	-	-	-	-
10.	pH (Standard Units)	8.57	8.60	8.56	7.09	8.57	7.9
11.	Total Acidity (mg/l CaCO ₃)	0.0	0.0	0.0	5.0	0.0	18.1
12.	Total Alkalinity (mg/l CaCO ₃)	133	157	126	46.2	132	131
13.	Specific Conductivity (umhos/cm at 25°C)	260	312	260	818	260	198
14.	Total Dissolved Solids (mg/l)	215	-	214	-	215	-
15.	Total Manganese (mg/l)	<0.02	<0.02	<0.02	0.03	<0.02	0.02
16.	Total Sulfates (mg/l)	81.3	20.0	96.0	199	89.3	40.1
17.	Total Iron (mg/l)	0.07	2.0	0.06	0.20	0.07	0.53
18.	Total Suspended Solids (mg/l)	2.1	27.0	2.5	10.1	1.3	20.9
19.	Total Hardness (mg/l as CaCO ₃)	135	222	131	144	133	151
20.	Date Sampled for Analysis	10/31/89	9/21/90	10/31/89	6/26/90	10/31/89	6/15/90
21.	Date Last Precipitation Event Occurred	10/31/89	9/19/90	10/31/89	6/26/90	10/31/89	6/14/90
22.	Nitrates	<0.1	1.67	<0.1		<0.1	1.51

 Laboratory Name Tradet. Inc.

 Address P.O. Box 2019

 State West Virginia

 City Wheeling

 zip 26003

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NOTE: For each sample provide data for either item 13 or item 14.

OHIO DEPARTMENT OF NATURAL RESOURCES
 DIVISION OF RECLAMATION

 ATTACHMENT 14A
 (HYDROLOGIC MEASUREMENTS AND ANALYSES)

 Applicant's Name THE OHIO VALLEY COAL COMPANY

1.	Identification No. of Sampling Station from Hydrology Map	W-33	W-33			W-47	
2.	Lab Identification Number	8907197	8910160			Note3	
3.	High (H)/Low (L) Designation (if applicable)	H	L				
4.	Surface Elevation for Sampling Station (msl)	1252	1252			1278	
☆ 5.	Depth of Well below Land Surface (feet)	50	50			-	
☆ 6.	Static Water Level of Well below Land Surface (feet)	16	16			-	
7.	Flow for Spring/Stream (gpm or cfs)	-	-				
8.	Date Above Measurements Made	7/12/89	10/12/89				
☆ 9.	Aquifer/Zone Identification for Well/Spring	L-5	L-5				
10.	pH (Standard Units)	7.36	7.39				
11.	Total Acidity (mg/l CaCO ₃)	13.2	10.4				
12.	Total Alkalinity (mg/l CaCO ₃)	189	168				
13.	Specific Conductivity (umhos/cm at 25°C)	500	520				
★★ 14.	Total Dissolved Solids (mg/l)	281	270				
15.	Total Manganese (mg/l)	<0.02	<0.02				
16.	Total Sulfates (mg/l)	40.0	37.6				
17.	Total Iron (mg/l)	0.05	0.08				
18.	Total Suspended Solids (mg/l)	3.8	1.3				
19.	Total Hardness (mg/l as CaCO ₃)	158	188				
20.	Date Sampled for Analysis	7/12/89	10/12/89				
21.	Date Last Precipitation Event Occurred	7/12/89	10/10/89				
22.	Nitrates	-	-				

 Laboratory Name Trader, Inc.

 Address P.O. Box 2019

 State West Virginia

 City Wheeling

 Zip 26003

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OHIO DEPARTMENT OF NATURAL RESOURCES
 DIVISION OF RECLAMATION

 ATTACHMENT 14A
 (HYDROLOGIC MEASUREMENTS AND ANALYSES)

 Applicant's Name THE OHIO VALLEY COAL COMPANY

1.	Identification No. of Sampling Station from Hydrology Map	D-21	D-21	U22-A	U22-A	U22-B	U22-B
2.	Lab Identification Number	8911019	9006415	8911026	9002176	8911027	9002177
3.	High (H)/Low (L) Designation (if applicable)	L	H	L	H	L	H
4.	Surface Elevation for Sampling Station (msl)	950	950	1135	1135	1109	1109
☆ 5.	Depth of Well below Land Surface (feet)	-	-	-	-	-	-
☆ 6.	Static Water Level of Well below Land Surface (feet)	-	-	-	-	-	-
7.	Flow for Spring/Stream (gpm or cfs)	20.0gpm	3.58cfs	6.0gpm	4.9gpm	8.7gpm	6.2gpm
8.	Date Above Measurements Made	10/31/89	6/20/90	10/31/89	2/6/90	10/31/89	2/6/90
☆ 9.	Aquifer/Zone Identification for Well/Spring	-	-	-	-	-	-
10.	pH (Standard Units)	8.56	8.30	8.57	7.70	8.57	7.74
11.	Total Acidity (mg/l CaCO ₃)	0.0	1.36	0.0	1.8	0.0	3.6
12.	Total Alkalinity (mg/l CaCO ₃)	129	141	127	82.8	131	90.5
13.	Specific Conductivity (umhos/cm at 25°C)	290	357	270	235	300	235
☆☆ 14.	Total Dissolved Solids (mg/l)	226	-	212	163	220	168
15.	Total Manganese (mg/l)	<0.02	0.30	<0.02	0.05	<0.02	0.05
16.	Total Sulfates (mg/l)	84.0	41.0	92.0	42.4	93.3	46.4
17.	Total Iron (mg/l)	<0.02	0.28	0.07	0.21	0.05	0.11
18.	Total Suspended Solids (mg/l)	2.5	4.0	9.3	12.7	2.1	7.1
19.	Total Hardness (mg/l as CaCO ₃)	138	187	138	68.4	135	75.2
20.	Date Sampled for Analysis	10/31/89	6/20/90	10/31/89	2/6/90	10/31/89	2/6/90
21.	Date Last Precipitation Event Occurred	10/31/89	6/17/90	10/31/89	2/4/90	10/31/89	2/4/90
22.	Nitrates	<0.1	0.12	<0.1	0.73	<0.1	0.33

 Laboratory Name Trader, Inc.

 Address P.O. Box 2019

 State West Virginia

 City Wheeling

 Zip 26003

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OHIO DEPARTMENT OF NATURAL RESOURCES
 DIVISION OF RECLAMATION

 ATTACHMENT 14A
 (HYDROLOGIC MEASUREMENTS AND ANALYSES)

 Applicant's Name THE OHIO VALLEY COAL COMPANY

1.	Identification No. of Sampling Station from Hydrology Map	U22-Q	U22-Q	D22-R	D22-R	P2	P2
2.	Lab Identification Number	8911176	9002163	8911177	9002164	9006198	8707241
3.	High (H)/Low (L) Designation (if applicable)	L	H	L	H	H	L
4.	Surface Elevation for Sampling Station (msl)	1175	1175	1045	1045	1215	1215
☆ 5.	Depth of Well below Land Surface (feet)	-	-	-	-	-	-
☆ 6.	Static Water Level of Well below Land Surface (feet)	-	-	-	-	-	-
7.	Flow for Spring/Stream (gpm or cfs)	2.7 gpm	5.9pgm	10.9gpm	21.7gmp	.016cfs	2 gpm
8.	Date Above Measurements Made	11/10/89	2/6/90	11/10/89	2/6/90	9/20/90	7/8/87
☆ 9.	Aquifer/Zone Identification for Well/Spring	-	-	-	-	-	-
10.	pH (Standard Units)	7.87	7.82	7.82	7.83	7.13	7.99
11.	Total Acidity (mg/l CaCO ₃)	4.1	3.0	0.4	2.4	38.5	4.40
12.	Total Alkalinity (mg/l CaCO ₃)	156	85.4	158	84.8	96.5	164
13.	Specific Conductivity (umhos/cm at 25°C)	440	265	460	265	684	436
☆☆ 14.	Total Dissolved Solids (mg/l)	226	159	276	163	-	-
15.	Total Manganese (mg/l)	0.05	0.04	0.18	0.03	0.06	0.03
16.	Total Sulfates (mg/l)	66.7	42.4	61.3	41.6	20.1	61.4
17.	Total Iron (mg/l)	0.28	0.13	1.10	0.16	0.18	0.62
18.	Total Suspended Solids (mg/l)	18.7	9.7	80.7	7.5	8.0	20.4
19.	Total Hardness (mg/l as CaCO ₃)	191	82.1	191	86.6	182	234
20.	Date Sampled for Analysis	11/10/89	2/6/90	11/10/89	2/6/90	9/20/90	7/8/87
21.	Date Last Precipitation Event Occurred	11/9/89	2/4/90	11/9/89	2/4/90	9/19/90	7/7/87
22.	Nitrates	0.12	1.49	0.22	1.27	-	-

 Laboratory Name Trader, Inc.

 Address P.O. Box 2019

 State West Virginia

 City Wheeling

 Zip 26003

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OHIO DEPARTMENT OF NATURAL RESOURCES
 DIVISION OF RECLAMATION

 ATTACHMENT 14A
 (HYDROLOGIC MEASUREMENTS AND ANALYSES)

 Applicant's Name THE OHIO VALLEY COAL COMPANY

1.	Identification No. of Sampling Station from Hydrology Map	U22-C	U22-C	D22-D	D22-D	U22-P	U22-P
2.	Lab Identification Number	8911028	9002178	8911029	9002180	8911175	9002162
3.	High (H)/Low (L) Designation (if applicable)	L	H	L	H	L	H
4.	Surface Elevation for Sampling Station (msl)	1100	1100	1085	1085	1215	1215
5.	Depth of Well below Land Surface (feet)	-	-	-	-	-	-
6.	Static Water Level of Well below Land Surface (feet)	-	-	-	-	-	-
7.	Flow for Spring/Stream (gpm or cfs)	12.6gpm	19.6gpm	15.9gpm	26.7gpm	2.6gpm	4.7gpm
8.	Date Above Measurements Made	10/31/89	2/6/90	10/31/89	2/6/90	11/10/89	2/6/90
9.	Aquifer/Zone Identification for Well/Spring	-	-	-	-	-	-
10.	pH (Standard Units)	8.57	7.69	8.56	7.78	7.90	7.86
11.	Total Acidity (mg/l CaCO ₃)	0.0	1.4	0.0	2.2	0.0	2.6
12.	Total Alkalinity (mg/l CaCO ₃)	130	84.8	125	84.2	160	89.7
13.	Specific Conductivity (umhos/cm at 25°C)	310	245	290	245	360	265
14.	Total Dissolved Solids (mg/l)	230	186	216	184	231	193
15.	Total Manganese (mg/l)	<0.02	0.05	<0.02	0.06	0.05	0.03
16.	Total Sulfates (mg/l)	85.3	44.0	92.0	44.0	56.0	57.6
17.	Total Iron (mg/l)	0.07	0.07	0.07	0.09	0.42	0.02
18.	Total Suspended Solids (mg/l)	1.7	5.9	1.7	4.3	23.9	<1.0
19.	Total Hardness (mg/l as CaCO ₃)	140	79.8	131	77.5	175	100
20.	Date Sampled for Analysis	10/31/89	2/6/90	10/31/89	2/6/90	11/10/89	2/6/90
21.	Date Last Precipitation Event Occurred	10/31/89	2/4/90	10/31/89	2/4/90	11/9/89	2/4/90
22.	Nitrates	<0.1	0.76	<0.1	0.84	<0.01	1.67

 Laboratory Name Trader, Inc.

 Address P.O. Box 2019
 State West Virginia

 City Wheeling
 Zip 26003

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OHIO DEPARTMENT OF NATURAL RESOURCES
 DIVISION OF RECLAMATION

 ATTACHMENT 14A
 (HYDROLOGIC MEASUREMENTS AND ANALYSES)

 Applicant's Name The Ohio Valley Coal Company

1.	Identification No. of Sampling Station from Hydrology Map	Sp-31A	Sp-31A				
2.	Lab Identification Number	SP-JJ	SP-JJ				
3.	High (H)/Low (L) Designation (if applicable)	H	L				
4.	Surface Elevation for Sampling Station (msl)	1200	1200				
☆ 5.	Depth of Well below Land Surface (feet)	-	-				
☆ 6.	Static Water Level of Well below Land Surface (feet)	-	-				
7.	Flow for Spring/Stream (gpm or cfs)	1.5gpm	0.22gpm				
8.	Date Above Measurements Made	7/16/90	9/18/90				
☆ 9.	Aquifer/Zone Identification for Well/Spring	L-3	L-3				
10.	pH (Standard Units)	7.21	6.98				
11.	Total Acidity (mg/l CaCO ₃)	3.6	4.6				
12.	Total Alkalinity (mg/l CaCO ₃)	60.1	57.2				
13.	Specific Conductivity (umhos/cm at 25°C)	566	588				
☆☆ 14.	Total Dissolved Solids (mg/l)	-	-				
15.	Total Manganese (mg/l)	0.01	0.02				
16.	Total Sulfates (mg/l)	47	38				
17.	Total Iron (mg/l)	0.21	0.28				
18.	Total Suspended Solids (mg/l)	5	12				
19.	Total Hardness (mg/l as CaCO ₃)	184	184				
20.	Date Sampled for Analysis	7/16/90	9/18/90				
21.	Date Last Precipitation Event Occurred	7/15/90	9/16/90				
	Nitrates (Mg/L)	2.88	2.77				
	Laboratory Name	ERI Labs					
	Address	P. O. Box 259		City	Brockway		
	State	Pennsylvania		Zip	15824		

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**OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION**

**ATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)**

Applicant's Name THE OHIO VALLEY COAL COMPANY

1.	Identification No. of Sampling Station from Hydrology Map	U-20	U-20	D-20	D-20	U21-A	U21-A
2.	Lab Identification Number	8911016	9009717	8911015	9002162	8911020	9002164
3.	High (H)/Low (L) Designation (if applicable)	L	H	L	H	L	H
4.	Surface Elevation for Sampling Station (msl)	1230	1230	990	990	1150	1150
☆ 5.	Depth of Well below Land Surface (feet)	-	-	-	-	-	-
☆ 6.	Static Water Level of Well below Land Surface (feet)	-	-	-	-	-	-
7.	Flow for Spring/Stream (gpm or cfs)	6 gpm	1.75cfs	15.1 gpm	4.7 gpm	2.5 gpm	21.7 gpm
8.	Date Above Measurements Made	10/31/89	9/21/90	10/31/89	2/6/90	10/31/89	2/6/90
☆ 9.	Aquifer/Zone Identification for Well/Spring	-	-	-	-	-	-
10.	pH (Standard Units)	8.56	8.25	8.57	7.86	8.42	7.83
11.	Total Acidity (mg/l CaCO ₃)	0.0	1.0	0.0	2.6	0.0	2.4
12.	Total Alkalinity (mg/l CaCO ₃)	129	136	127	89.7	128	84.8
13.	Specific Conductivity (umhos/cm at 25°C)	270	387	255	265	270	265
☆☆ 14.	Total Dissolved Solids (mg/l)	226	-	231	193	221	163
15.	Total Manganese (mg/l)	<0.02	<0.02	<0.02	0.03	<0.02	0.03
16.	Total Sulfates (mg/l)	92.0	19.0	89.3	57.6	81.3	41.6
17.	Total Iron (mg/l)	<0.02	1.77	0.05	0.02	0.20	0.16
18.	Total Suspended Solids (mg/l)	4.9	13.1	<1.0	<1.0	23.7	7.5
19.	Total Hardness (mg/l as CaCO ₃)	129	165	133	100	133	86.6
20.	Date Sampled for Analysis	10/31/89	9/21/90	10/31/89	2/6/90	10/31/89	2/6/90
21.	Date Last Precipitation Event Occurred	10/31/89	9/19/90	10/31/89	2/6/90	10/31/89	2/6/90
22.	Nitrates	<0.1	1.61	<0.1	1.67	<0.1	1.27

Laboratory Name Tradet. Inc.

Address P.O. Box 2019

State West Virginia

City Wheeling

Zip 26003

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DIVISION OF RECLAMATION

ATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)Applicant's Name THE OHIO VALLEY COAL COMPANY

1.	Identification No. of Sampling Station from Hydrology Map	W-B3	W-33	U-6	U-6	W-47	
2.	Lab Identification Number	8907197	8910160	8707241	8804207	Note3	
3.	High (H)/Low (L) Designation (if applicable)	H	L	L	H		
4.	Surface Elevation for Sampling Station (msl)	1252	1252	1215	1215	1278	
5.	Depth of Well below Land Surface (feet)	50	50	-	-	-	
6.	Static Water Level of Well below Land Surface (feet)	16	16	-	-	-	
7.	Flow for Spring/Stream (gpm or cfs)	-	-	2 gpm	3 gpm		
8.	Date Above Measurements Made	7/12/89	10/12/89	7/8/87	3/30/88		
9.	Aquifer/Zone Identification for Well/Spring	L-5	L-5	-	-		
10.	pH (Standard Units)	7.36	7.39	7.99	7.96		
11.	Total Acidity (mg/l CaCO ₃)	13.2	10.4	4.40	5.2		
12.	Total Alkalinity (mg/l CaCO ₃)	189	158	164	109		
13.	Specific Conductivity (umhos/cm at 25°C)	500	520	436	280		
14.	Total Dissolved Solids (mg/l)	281	270	-	-		
15.	Total Manganese (mg/l)	10.02	10.02	0.03	0.03		
16.	Total Sulfates (mg/l)	40.0	37.6	61.4	42.0		
17.	Total Iron (mg/l)	0.05	0.08	0.62	0.51		
18.	Total Suspended Solids (mg/l)	3.8	1.3	20.4	28.5		
19.	Total Hardness (mg/l as CaCO ₃)	158	188	234	152		
20.	Date Sampled for Analysis	7/12/89	10/12/89	7/8/87	3/30/88		
21.	Date Last Precipitation Event Occurred	7/12/89	10/10/89	7/7/87	3/27/88		
22.	Nitrates	-	-	-	-		

Laboratory Name Tradet, Inc.Address P.O. Box 2019State West VirginiaCity WheelingZip 26003

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JUL 12 1990

D0360-1

ADDENDUM TO ATTACHMENT 14
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
PERMIT D-0360

Several developed groundwater sources could not be measured for depth. In some cases, the landowners knew the depth of the well, and these are noted. The reasons why certain wells were not measured included:

- Note 1 - The well was covered with dirt, concrete, or a metal hand pump and could not be accessed for measurement.
- Note 2 - The original landowner refused to allow sampling or measurement or both.
- Note 3 - The well was covered and not equipped with a working pump so measurements and sampling was not possible.
- Note 4 - These water supplies are newly developed. Sampling was begun in June, 1990 and will be reported when appropriate.

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 14B
(GROUND WATER HYDROLOGY DESCRIPTION)

Applicant's Name

THE OHIO VALLEY COAL COMPANY

Aquifer/Zone Identification	Aquifer/Zone Lithology	Aquifer/Zone Thickness	Aquifer/Zone Elev. (msl)	Aquifer/Zone Horizontal Extent	Aquifer/Zone Known Uses	Approx. Rate of Discharge/Usage of Aquifer/Zone (gpm or cfs)
L-3	Shale	11'	1193-1202	Outcrop to Outcrop	Livestock, Domestic	2-4 gpm
L-4	Shale	8'	1219	Outcrop to Outcrop	Domestic	2-4 gpm
L-5	Shale	11'	1230-1236	Outcrop to Outcrop	Domestic	2-4 gpm
L-6	Shale	8'	1243-1261	Outcrop to Outcrop	Domestic	2-4 gpm
L-7	Limey Shale	7'	1267-1272	Outcrop to Outcrop	Domestic	2-4 gpm
L-2	Limey Shale	9'	1164-1176	Outcrop to Outcrop	Not Used	2-4 gpm

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 14C
(WELL/SPRING INVENTORY)

Applicant's Name THE OHIO VALLEY COAL COMPANY

Well/Spring Identification Number	Name of Owner of Well/Spring	Surface Elevation of Well/Spring	Depth of Well in Feet Below Land Surface	Static Water Level of Well in Feet Below Land Surface	Lithology of Supplying Aquifer/ Waterbearing Zone	Known Uses of Well/Spring (if spring give discharge rate)
W-48	Campbell	1270	35'	8'-10'	L-5	Unused
SP-27	Campbell	1200	-	-	L-3	Livestock
SP-28	Campbell	1200	-	-	L-3	Livestock
SP-25	Campbell	1240	-	-	L-6	Livestock
SP-26	Campbell	1230	-	-	L-5	Livestock
SP-23	Otto	1251	-	-	L-6	Livestock
SP-24	Otto	1267	-	-	L-6	Livestock
SP-21	Perkins	1164	-	-	L-2	Not Used
W-47	OVCC	1278	-	-	Unknown	Not Used
SP-29	Caretti	1265	-	-	L-2	Livestock
SP-30	Caretti	1266	-	-	L-2	Livestock

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 14C
(WELL/SPRING INVENTORY)

Applicant's Name THE OHIO VALLEY COAL COMPANY

Well/Spring Identification Number	Name of Owner of Well/Spring	Surface Elevation of Well/Spring	Depth of Well in Feet Below Land Surface	Static Water Level of Well in Feet Below Land Surface	Lithology of Supplying Aquifer/ Waterbearing Zone	Known Uses of Well/Spring (if spring give discharge rate)
W-46	OVCC	1286	Unknown	Unknown	Unknown	Domestic
W-45	Campbell	1273	Unknown	Unknown	Unknown	Domestic
W-44	Grant	1297	Unknown	Unknown	Unknown	Domestic
W-43	Otto	1263	Unknown	Unknown	Unknown	Livestock
W-34	Otto	1272	26'	11'	L-7	Domestic
W-27	Ooten	1283	90'	30' - 32'	L-6	Domestic
W-28	OVCC	1299	Unknown	Unknown	Unknown	Unused
W-33	OVCC	1252	50'	16'	L-5	Domestic
W-26	Ogilbee	1297	80'	41' - 45'	L-6	Domestic
W-25	Ogilbee	1272	Unknown	Unknown	Unknown	Domestic
W-24	Ogilbee	1266	77'	48'	L-4	Domestic & Livestock

**ATTACHMENT 14C
(MELL/SRING INVENTORY)**

Applicant's Name THE OHIO VALLEY COAL COMPANY

[illegible]

**OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION****ATTACHMENT 14D
(SURFACE WATER BODIES/PUBLIC WATER SUPPLIES)**Applicant's Name The Ohio Valley Coal Company

Surface Water/ Public Supply Identification #	Type of Surface Water/Public Supply	Name of Owner of Surface Water/ Public Supply	Known Uses of Surface Water/ Public Supply
U-20	Stream	Thomas Tacosik	Unused
U-21-A	Stream	OVCC	Unused
U-21-B	Stream	OVCC	Unused
U-21-C	Stream	OVCC	Unused
U-21-D	Stream	OVCC	Unused
U-21-E	Stream	Greg Blaney	Livestock
U21-F	Stream	Chalmer & Ida Campbell	Livestock

**OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION****ATTACHMENT 14D
(SURFACE WATER BODIES/PUBLIC WATER SUPPLIES)**Applicant's Name The Ohio Valley Coal Company

Surface Water/ Public Supply Identification #	Type of Surface Water/Public Supply	Name of Owner of Surface Water/ Public Supply	Known Uses of Surface Water/ Public Supply
U-21-G	Stream	Richard & Vernice Otto	Livestock
U-22-A	Stream	Betty L. Dunfee	Unused
U-22-B	Stream	OVCC	Unused
U-22-C	Stream	OVCC	Unused
U-22-P	Stream	Chalmer & Ida Campbell	Livestock
U-22-Q	Stream	Delmas W. & Mary L. Caretti	Livestock

**OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION****ATTACHMENT 14D
(SURFACE WATER BODIES/PUBLIC WATER SUPPLIES)**Applicant's Name THE OHIO VALLEY COAL COMPANY

Surface Water/ Public Supply Identification #	Type of Surface Water/Public Supply	Name of Owner of Surface Water/ Public Supply	Known Uses of Surface Water/ Public Supply
PW4	Public Water Line	Perkins	Domestic
PW5	Public Water Line	OVCC	Domestic
PW6	Public Water Line	R & V Otto	Domestic
PW7	Public Water Line	S & B Otto	Domestic
PW8	Public Water Line	Campbell	Domestic
PW9	Public Water Line	OVCC	Domestic
PW10	Public Water Line	OVCC	Domestic

**OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION****ATTACHMENT 14D
(SURFACE WATER BODIES/PUBLIC WATER SUPPLIES)**Applicant's Name THE OHIO VALLEY COAL COMPANY

Surface Water/ Public Supply Identification #	Type of Surface Water/Public Supply	Name of Owner of Surface Water/ Public Supply	Known Uses of Surface Water/ Public Supply
PW11	Public Water Line	W & B Ogilbee	Domestic
PW12	Public Water Line	K Ogilbee	Domestic
PW13	Public Water Line	A & M Ogilbee	Domestic
P-1	Pond	A & M Ogilbee	Livestock
P-2	Pond	A & M Ogilbee	Livestock

D. SURFACE WATER INFORMATION-Permit, Shadow Area, and Adjacent Area

- (1) List the name of the watershed that will receive water discharges from the proposed permit, shadow, and adjacent areas as listed in the "Gazetteer of Ohio Streams" published by the Ohio Department of Natural Resources.

Captina Creek

- (2) Are there any perennial or intermittent streams or other surface water bodies on the proposed permit, shadow area, and adjacent area? X Yes, No.
If "yes," submit Attachment 14A and Attachment 14D and show location on application and hydrology map.

See Attachment 14A, 14D, and Hydrology Map

- (3) Based on the data listed on Attachment 14A, and other information submitted with this application, identify the seasonal variations in water quality and quantity for the streams identified in Part 2, D(2) above.

See Attachment 14A

E. HYDROLOGIC DETERMINATION-Permit, Shadow Area, and Adjacent Area

Based on the information submitted in response to items B, C, and D in this part of the permit application, submit an addendum describing the probable hydrologic consequences of this proposed underground mining operation on the hydrologic regime of the proposed permit area, shadow area, and adjacent area. The description shall include findings on each of the following items:

- (1) The consequences of the proposed operation on the contents of total suspended and dissolved solids, total iron, total manganese, acidity, and pH.

See Addendum to Page 19, Part 2, E

- (2) Whether adverse impacts may occur to the hydrologic balance;

See Addendum to Page 19, Part 2, E

- (3) The impact the proposed operation will have on:

- (a) sediment yield from the disturbed area,
(b) flooding and stream flow alteration or diminution,
(c) ground water and surface water availability.

See Addendum to Page 19, Part 2, E

F. ALTERNATIVE WATER SUPPLY INFORMATION-Permit, Shadow Area, and Adjacent Area

- (1) Based on the response in Part 2, item E, submit an addendum identifying the extent to which the proposed coal mining activities may proximately result in contamination, diminution, or interruption of an underground or surface source of water within the proposed permit area, shadow area, and adjacent area that is used for domestic, agricultural, industrial, or other legitimate use.

See Addendum to Page 19, Part 2, F

ADDENDUM TO PAGE 19, PART 2, D
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
PERMIT D-0360

HYDROLOGIC MEASUREMENTS AND ANALYSIS

THE FOLLOWING DATA IS TAKEN FROM:

WATER RESOURCES DATA FOR OHIO, 1985
WATER RESOURCES DATA FOR OHIO, 1978

PUBLISHED BY

THE UNITED STATES GEOLOGICAL SURVEY

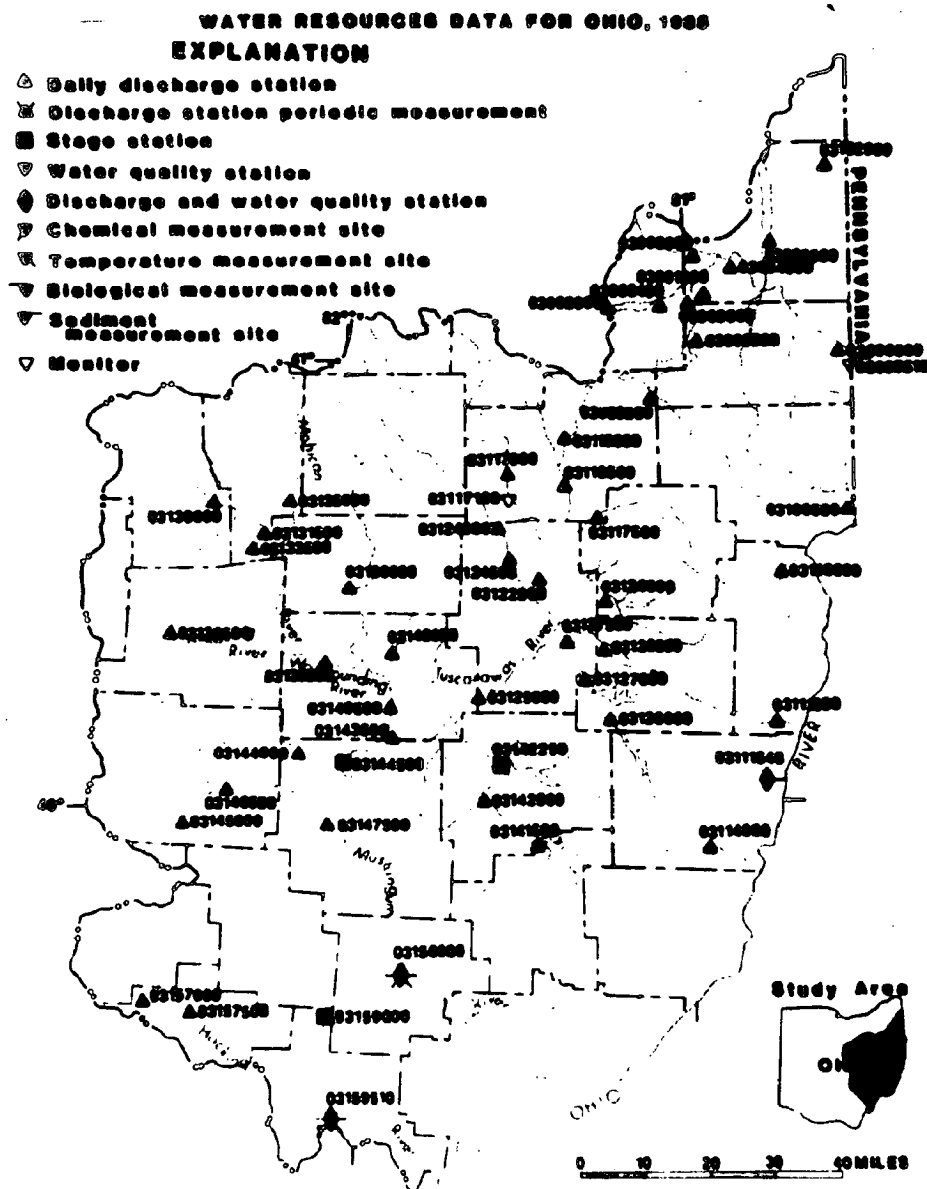


Figure 3b.--Location of data-collection stations excluding crest-stage and low-flow partial record sites and wells.

CAPTAIN CREEK BASIN

01110000 CAPTAIN CREEK AT ANNEVILLE HILLS, MD

LOCATION.—Lat 39°54'11", long 80°55'27", in SW 1/4 sec. 18, T.8 N., R.4 E., Baltimore County, Hydrologic Unit 02050100, on left bank at downstream side of bridge on State Highway 100, 0.5 mi east of Annapolis Hills, and 0.7 mi downstream from Anderson Run.

WATERSHED AREA.—134 mi².

PERIOD OF RECORD.—August 1904 to September 1939, October 1950 to current year.

RECORDING METHOD.—Gage 1907: Rainage area.

GAGE.—Water-stage recorder. Datum of gage is 739.53 ft above National Geodetic Vertical Datum of 1929. Aug. 20, 1904 to Sept. 30, 1939, nonrecording gage at same site, at datum 1.0 ft higher.

REMARKS.—Estimated daily discharges: Dec. 6-6 and Jan. 10 to Feb. 21. Records good except for periods of estimated record, which are fair. Water-quality data collected at this site 1950 to 1977. Sediment data collected 1950 to 1974.

AVERAGE DISCHARGE.—34 years, 143 ft³/s, 16.52 in/yr.

REMARKS FOR PERIOD OF RECORD.—Maximum discharge, 21,000 ft³/s Aug. 11, 1909, gage height, 17.40 ft; no flow at times during 1922-24, 1932, 1934, 1950, 1953-55, 1972-74.

REMARKS FOR CURRENT YEAR.—Peak discharges greater than base discharge of 3,000 ft³/s and minimum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Feb. 23	1700	2,320	6.42				
Minimum discharge, 0.13 ft ³ /s Sept. 21, 22.							

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1904 TO SEPTEMBER 1960

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.0	20	23	209	40	174	611	41	33	3.5	1.3	6.5
2	15	53	77	127	60	182	209	203	22	3.4	1.1	3.9
3	10	50	69	150	38	125	341	422	167	6.6	1.6	2.6
4	6.7	37	50	135	38	117	259	163	100	10	1.6	1.6
5	6.7	100	68	134	38	104	242	112	67	7.6	1.4	1.5
6												
7	4.0	50	44	183	34	137	206	93	47	29	1.1	.75
8	4.2	20	60	97	35	114	219	60	33	20	.70	.39
9	6.9	20	30	84	35	172	443	65	26	16	1.5	.29
10	14	23	34	73	34	174	353	58	42	8.3	1.7	.35
11	15	144	200	70	34	167	282	49	33	6.0	1.7	.80
12												
13	10	604	476	45	34	143	252	66	25	6.0	1.0	.06
14	7.4	102	297	60	80	400	213	41	120	4.9	.89	.02
15	7.6	101	210	60	80	323	101	30	71	3.0	.70	.56
16	7.0	70	294	55	110	250	163	32	40	3.5	.36	2.6
17	5.3	50	277	55	100	197	146	34	33	35	.29	1.0
18												
19	5.1	74	200	55	90	150	132	60	31	29	34	.57
20	4.0	50	136	50	80	144	122	84	27	12	33	.20
21	4.0	40	125	50	75	117	100	63	29	5.2	13	.26
22	5.6	44	111	50	70	103	91	54	26	3.4	6.1	.32
23	5.0	70	181	45	65	100	63	27	21	2.6	3.4	.26
24												
25	4.7	57	214	45	65	87	76	20	10	2.6	2.2	.10
26	15	40	647	40	1240	82	70	20	16	12	1.0	.19
27	10	43	310	40	1750	97	65	25	20	13	1.6	.64
28	15	41	224	44	1100	96	62	25	21	6.4	2.8	.56
29	22	30	191	44	600	86	65	23	15	3.3	62	.15
30												
31	10	34	134	44	304	70	56	21	9.0	3.3	45	.10
32	16	30	121	44	271	64	51	30	6.0	8.7	15	.27
33	15	30	123	42	205	64	60	44	6.0	9.0	7.1	.25
34	15	90	102	42	---	79	64	43	4.5	4.2	3.7	.10
35	40	64	221	42	---	1350	60	27	5.0	2.5	5.5	.20
36	27	---	243	40	---	1300	---	35	---	1.7	1.5	---

YEAR	TOTAL	MEAN	MAX	MIN	COEFF	STDEV	VAR
CAL YR 1904	69045.07	127.0	2100	0.0	1.03	12.50	156.25
WTR YR 1905	31600.72	92.5	1750	0.0	.68	9.27	85.93

CAPTAIN CROWN BRIDGE

01110000 CAPTAIN CROWN AT SPANISH BRIDGE, OH

LOCATION.--See 1970-1971, from 00000000, to 00 1/4 sec. 10, T.1 S., R.6 E., Adams County, Springfield Ohio
 191000, on left bank at downstream side of bridge on State Highway 140, 6.0 mi (9.6 km) east of Springfield
 01110, and 6.7 mi (10.7 km) downstream from Indian Run.

DATE--1971-1972 (1971 only).

PERIOD OF RECORD.--August 1974 to September 1975, October 1976 to present year.

REVISED RECORDS.--1971-1972: Drainage area.

DATA.--Water-stage records. Dates of stage to 714.51 ft (225.009 m) National Geodetic Vertical Datum of 1929.
 Aug. 20, 1976 to Sept. 30, 1977, nonrecording gage at same site, at datum 1.0 ft (0.30 m) higher.

QUALITY.--Records good except for the winter periods, which are faint. Water-quality data collected on this site
 1974 to 1977. Sediment data collected 1974 to 1976.

REMARKS DISCUSSION.--20 years, 160 ft²/s (4.51 m²/s), 14.21 in/yr (0.12 m/yr).

REMARKS FOR RECORD.--Business discharges, 12,000 ft³/s (340 m³/s) Sept. 7, 1975, stage height, 714.61 ft
 (218.19 m); business stage height, 714.60 ft (218.18 m), present stage, Dec. 7, 1975; no flow at times during 1974-
 75, 1976, 1977, 1978, 1979, 1980-81, 1982-83.

REMARKS FOR RECORD.--Peak discharges above base of 1,000 ft²/s (28.3 m²/s) and business (1971)

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Stage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Stage height (ft) (m)
Dec. 5	1700	0177	714	Mar. 10	1700	01700	714
Dec. 24	2200	001	714	June 28	0130	1000	714

Discharge in 1971, 1972, 1973, 1974, 1975, 1976, 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 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2965, 2966, 2967, 2968, 2969, 2970, 2971, 2972, 2973, 2974, 2975, 2976, 2977, 2978, 2979, 2980, 2981, 2982, 2983, 2984, 2985, 2986, 2987, 2988, 2989, 2990, 2991, 2992, 2993, 2994, 2995, 2996, 2997, 2998, 2999, 3000, 3001, 3002, 3003, 3004, 3005, 3006, 3007, 3008, 3009, 3010, 3011, 3012, 3013, 3014, 3015, 3016, 3017, 3018, 3019, 3020, 3021, 3022, 3023, 3024, 3025, 3026, 3027, 3028, 3029, 3030, 3031, 3032, 3033, 3034, 3035, 3036, 3037, 3038, 3039, 3040, 3041, 3042, 3043, 3044, 3045, 3046, 3047, 3048, 3049, 3050, 3051, 3052, 3053, 3054, 3055, 3056, 3057, 3058, 3059, 3060, 3061, 3062, 3063, 3064, 3065, 3066, 3067, 3068, 3069, 3070, 3071, 3072, 3073, 3074, 3075, 3076, 3077, 3078, 3079, 3080, 3081, 3082, 3083, 3084, 3085, 3086, 3087, 3088, 3089, 3090, 3091, 3092, 3093, 3094, 3095, 3096, 3097, 3098, 3099, 3100, 3101, 3102, 3103, 3104, 3105, 3106, 3107, 3108, 3109, 3110, 3111, 3112, 3113, 3114, 3115, 3116, 3117, 3118, 3119, 3120, 3121, 3122, 3123, 3124, 3125, 3126, 3127, 3128, 3129, 3130, 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3297, 3298, 3299, 3300, 3301, 3302, 3303, 3304, 3305, 3306, 3307, 3308, 3309, 3310, 3311, 3312, 3313, 3314, 3315, 3316, 3317, 3318, 3319, 3320, 3321, 3322, 3323, 3324, 3325, 3326, 3327, 3328, 3329, 3330, 3331, 3332, 3333, 3334, 3335, 3336, 3337, 3338, 3339, 3340, 3341, 3342, 3343, 3344, 3345, 3346, 3347, 3348, 3349, 3350, 3351, 3352, 3353, 3354, 3355, 3356, 3357, 3358, 3359, 3360, 3361, 3362, 3363, 3364, 3365, 3366, 3367, 3368, 3369, 3370, 3371, 3372, 3373, 3374, 3375, 3376, 3377, 3378, 3379, 3380, 3381, 3382, 3383, 3384, 3385, 3386, 3387, 3388, 3389, 3390, 3391, 3392, 3393, 3394, 3395, 3396, 3397, 3398, 3399, 3400, 3401, 3402, 3403, 3404, 3405, 3406, 3407, 3408, 3409, 3410, 3411, 3412, 3413, 3414, 3415, 3416, 3417, 3418, 3419, 3420, 3421, 3422, 3423, 3424, 3425, 3426, 3427, 3428, 3429, 3430, 3431, 3432, 3433, 3434, 3435, 3436, 3437, 3438, 3439, 3440, 3441, 3442, 3443, 3444, 3445, 3446, 3447, 3448, 3449, 3450, 3451, 3452, 3453, 3454, 3455, 3456, 3457, 3458, 3459, 3460, 3461, 3462, 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3629, 3630, 3631, 3632, 3633, 3634, 3635, 3636, 3637, 3638, 3639, 3640, 3641, 3642, 3643, 3644, 3645, 3646, 3647, 3648, 3649, 3650, 3651, 3652, 3653, 3654, 3655, 3656, 3657, 3658, 3659, 3660, 3661, 3662, 3663, 3664, 3665, 3666, 3667, 3668, 3669, 3670, 3671, 3672, 3673, 3674, 3675, 3676, 3677, 3678, 3679, 3680, 3681, 3682, 3683, 3684, 3685, 3686, 3687, 3688, 3689, 3690, 3691, 3692, 3693, 3694, 3695, 3696, 3697, 3698, 3699, 3700, 3701, 3702, 3703, 3704, 3705, 3706, 3707, 3708, 3709, 3710, 3711, 3712, 3713, 3714, 3715, 3716, 3717, 3718, 3719, 3720, 3721, 3722, 3723, 3724, 3725, 3726, 3727, 3728, 3729, 3730, 3731, 3732, 3733, 3734, 3735, 3736, 3737, 3738, 3739, 3740, 3741, 3742, 3743, 3744, 3745, 3746, 3747, 3748, 3749, 3750, 3751, 3752, 3753, 3754, 3755, 3756, 3757, 3758, 3759, 3760, 3761, 3762, 3763, 3764, 3765, 3766, 3767, 3768, 3769, 3770, 3771, 3772, 3773, 3774, 3775, 3776, 3777, 3778, 3779, 3780, 3781, 3782, 3783, 3784, 3785, 3786, 3787, 3788, 3789, 3790, 3791, 3792, 3793, 3794, 3795, 3796, 3797, 3798, 3799, 3800

WATER RESOURCES DATA FOR OHIO, 1986

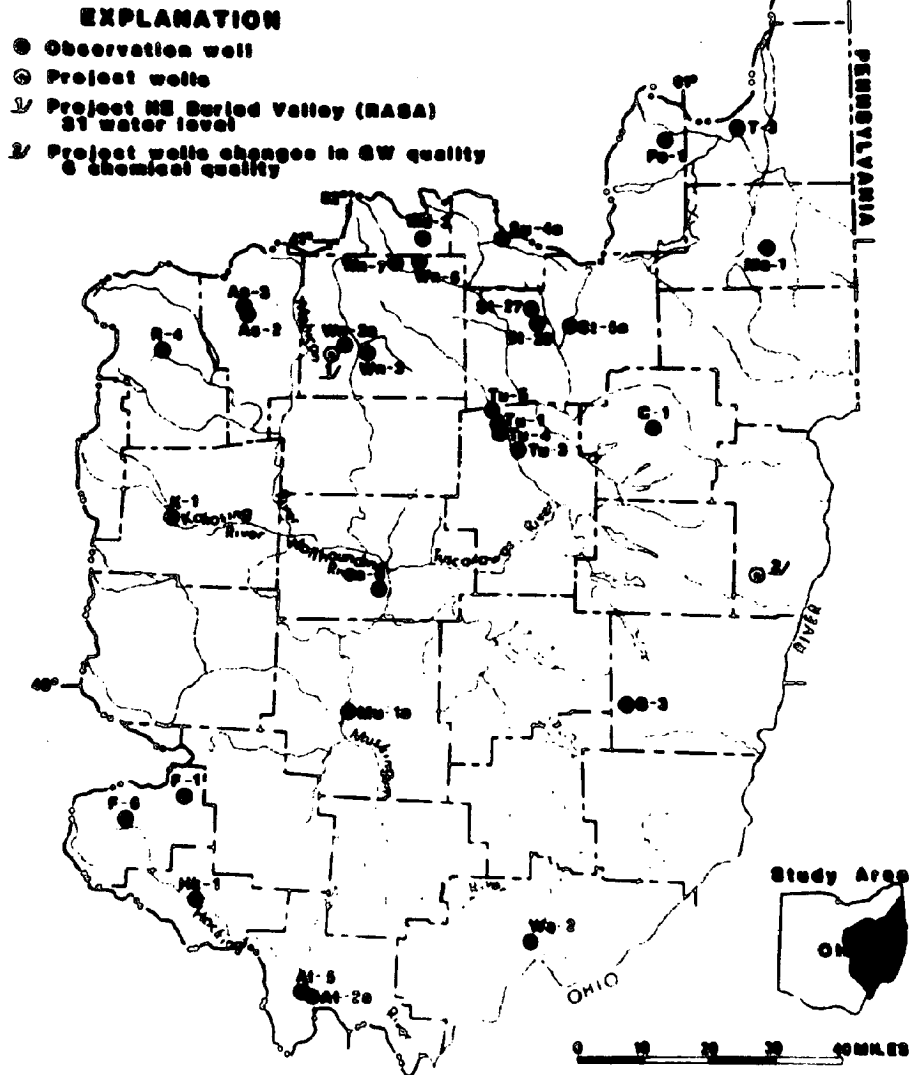


Figure 31.--Location of wells.

340

GROUND-WATER RECORD

SALINE COUNTY

00011000000000. Local number, 5-3.

LOCATION.—Lat 38°31'10", Long 91°58'22". Hydrologic Unit 09040001, W. Chivett Public Square, W. Chivett, MO.

Owner: Village of W. Chivett.

Aquifer:—Class 2 Heavy Sandstone Age.

WELL CHARACTERISTICS.—Drilled observation well, diameter 4 in., depth 119 ft.

Instrumentation.—Type 7 continuous recorder.

NOTE.—Elevation of land-surface datum is 1265 ft above National Geodetic Vertical Datum of 1929, from topographic

map. Recording point: Floor of instrument shelter, 1.5 ft above land-surface datum.

Remarks.—Station operated by Ohio Department of Natural Resources, Division of Water.

PERIOD OF RECORD.—July 15, 1961 to current year.

REMARKS FOR PERIOD OF RECORD.—Minimum daily low, 61.44 ft Sept. 29-30, 1961; minimum daily low, 65.61 ft below

land-surface datum, July 19-20.

WATER YEAR OCTOBER 1960 TO SEPTEMBER 1961												
WATER LEVEL (FEET)												
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	60.36	59.95	---	57.78	58.00	57.97	58.18	58.92	59.60	60.06	60.71	61.07
2	---	59.97	---	57.88	58.13	57.88	58.19	58.92	59.74	60.08	60.70	61.10
3	---	59.95	---	57.88	58.37	57.89	58.14	58.92	59.70	60.07	60.62	61.10
4	---	58.82	---	57.88	58.31	57.87	58.05	58.64	59.60	60.00	60.65	61.10
5	---	58.60	---	57.73	58.30	57.96	57.94	58.64	59.70	60.11	60.63	61.10
6	---	58.65	---	57.73	58.15	58.11	57.93	58.61	59.60	60.15	60.65	61.07
7	---	58.67	---	57.71	58.33	58.11	57.99	58.64	59.62	60.23	60.65	61.10
8	---	58.67	---	57.88	58.33	58.06	57.90	58.10	58.73	60.23	60.65	61.10
9	---	58.63	---	57.95	58.30	58.11	58.03	58.13	58.73	60.23	60.67	61.10
10	---	58.53	---	57.95	58.41	58.13	58.63	58.13	58.74	60.23	60.60	61.13
11	---	58.43	---	57.97	58.41	58.13	57.93	58.13	58.70	60.20	60.63	61.10
12	---	58.15	---	58.01	58.33	58.13	57.93	58.13	58.65	60.23	60.65	61.10
13	---	58.17	58.20	58.01	58.15	58.07	57.93	58.15	58.71	60.20	60.65	61.10
14	---	58.20	58.20	57.99	58.23	58.10	57.93	58.19	58.70	60.20	61.05	61.00
15	59.71	58.67	58.20	58.17	58.24	58.18	---	58.20	58.70	60.20	61.05	61.00
16	59.66	57.80	58.21	58.27	58.24	58.10	---	58.20	58.73	60.40	61.00	61.30
17	59.61	57.80	58.05	58.20	58.20	58.00	---	58.13	58.73	60.45	61.00	61.30
18	59.60	57.87	57.94	58.15	58.20	58.17	---	58.20	58.71	60.40	61.07	61.33
19	59.25	57.83	57.89	58.24	58.23	58.10	---	58.20	58.73	60.47	61.00	61.30
20	59.25	57.91	57.80	58.04	58.20	58.23	---	58.21	58.70	60.40	61.13	61.30
21	59.37	58.00	57.80	58.20	58.10	58.27	---	59.00	59.61	60.40	61.13	61.34
22	59.40	58.01	57.70	58.10	58.00	58.20	---	59.41	59.65	60.45	61.14	61.33
23	59.61	57.80	57.77	58.00	58.00	58.23	---	59.00	59.65	60.35	61.10	61.33
24	59.50	---	57.70	58.00	58.00	58.23	---	59.03	59.60	60.35	61.13	61.30
25	59.40	---	57.80	58.03	58.30	58.41	58.43	59.07	59.60	60.30	61.11	61.37
26	59.34	---	57.80	58.07	58.11	58.47	58.43	59.40	59.67	60.30	61.13	61.34
27	59.34	---	57.80	58.07	58.16	58.40	58.43	59.41	59.60	60.43	61.14	61.34
28	59.15	---	57.83	58.00	58.13	58.40	58.70	59.30	59.60	60.67	61.16	61.43
29	59.09	---	57.75	58.00	---	58.40	58.60	59.43	59.92	60.60	61.16	61.44
30	59.09	---	57.83	58.03	---	58.40	58.60	59.64	60.00	60.70	61.10	61.44
31	59.00	---	57.83	58.03	---	58.04	---	59.63	---	60.70	61.04	---
MEAN	---	---	---	58.05	58.41	58.67	---	59.64	60.00	60.70	61.10	61.44
WTR YR 1960 MEAN 59.34 HIGH 57.71 JAN 7 LOW 61.44 SEP 29 AND OTHERS												

HYDROLOGIC MEASUREMENTS
AND ANALYSIS

THE FOLLOWING DATA IS TAKEN FROM:

BIOLOGICAL AND WATER QUALITY STUDY
OF
McMAHON, CAPTINA AND SUNFISH CREEKS
AND SELECTED TRIBUTARIES

BELMONT AND MONROE COUNTIES, OHIO
DRAFT, APRIL 1986

PREPARED BY:

DIVISION OF WATER QUALITY
MONITORING AND ASSESSMENT
OHIO ENVIRONMENTAL PROTECTION AGENCY
COLUMBUS, OHIO 43226-1049

Appendix C Table 1. (Continued).

Station (RM) 3.3

General Location: Upstream from Steinerville, adjacent SR 148
County: Belmont
Sampling Method: Dipnet/handpick
Substrate Characterization: Primarily rubble and much coarse gravel with
boulder, fine gravel, sand, silt, and detritus
Substrate Compaction: Firm
Width (Range): 25 to 50 Feet
Depth (Range): 3 to 18 inches
Habitat: Pool, riffle, run
Canopy: Open
Riparian vegetation: Large trees
Land use: Agricultural/rural

Bend Fork

Station (RM) 12.3

General Location: 20 feet upstream from Bethesda WWTP discharge
County: Belmont
Sampling Method: Dipnet/handpick
Substrate Characterization: Primarily coarse gravel with rubble, fine gravel,
sand, silt and detritus
Substrate Compaction: Firm
Width (Range): 1 to 4 feet
Depth (Range): 6 to 12 inches
Habitat: Pool, riffle, run
Canopy: Closed
Riparian vegetation: Large trees
Land use: Agricultural/rural

Station (RM) 11.5

General Location: At Junction of CR 86 and TR 200
County: Belmont
Sampling Method: Dipnet/handpick
Substrate Characterization: Primarily fine gravel, and much sand and muck
with coarse gravel, silt, detritus, and peat
Substrate Compaction: Soft
Width (Range): 3 to 6 Feet
Depth (Range): 1 to 12 inches
Habitat: Pool, riffle, run
Canopy: 75% open
Riparian vegetation: Grass
Land use: Agricultural/rural

Station (RM) 8.4

General Location: Downstream from Packsaddle Run

County: Belmont

Sampling Method: Dipnet/handpick

Substrate Characterization: Primarily rubble with bedrock, boulder, gravel, sand, silt and detritus

Substrate Compaction: Firm

Width (Range): 8 to 20 Feet

Depth (Range): 2 to 18 inches

Habitat: Pool, riffle, run

Canopy: 75% open

Riparian vegetation: Large trees

Land use: Agricultural/rural

Station (RM) 0.4

General Location: Near mouth

County: Belmont

Sampling Method: Dipnet/handpick

Substrate Characterization: Primarily rubble, and much bedrock and coarse gravel with boulder, fine gravel, sand, silt and detritus

Substrate Compaction: Firm

Width (Range): 15 to 25 feet

Depth (Range): 2 to 24 inches

Habitat: Pool, riffle, run

Canopy: 50% open

Riparian vegetation: Large trees

Land use: Agricultural/rural

6. 05030106-052

North Fork Captina Creek

RM 10.5 - Mouth

GENERALLY GOOD
TO EXCEPTIONAL

Rationale:

Water quality was considered good for the entire stream segment, although some nutrient enrichment was recorded 1.5 miles downstream from the Barnesville WWTP (RM 10.5). The biological community immediately downstream from the WWTP was indicative of some organic enrichment with complete recovery documented 4 miles downstream. Good water quality and an exceptional biological community were documented in the lower segment of the North Fork Captina Creek.

7. 05030106-053

South Fork Captina Creek

RM 12.0 - Mouth

GOOD

Rationale:

Water quality and biological condition were considered good in the lower segment of the South Fork (RM 1.0-0). Based largely on the absence of point source dischargers and abandoned underground mines, good instream conditions appear likely in the remainder of the South Fork.

8. 05030106-050

Bend Fork

RM 12.3 - Mouth

GENERALLY GOOD

Rationale:

Bend Fork was generally characterized by fair-good water quality and fair-good biological condition. Biological communities revealed influences from nutrient enrichment and slightly elevated ammonia-N values in the upper stream reach, and apparently resulted from both point and nonpoint source inputs. Complete recovery in water quality and biological condition was documented at RM 8.4.

9. 05030201-061
05030201-059
05030201-057
05030201-055

Sunfish Creek
Sunfish Creek
Sunfish Creek
Sunfish Creek

Headwaters - RM 22.9
RM 22.9 - 14.7
RM 14.7 - 7.8
RM 7.8 - 7.6

GOOD

Rationale:

The mainstem was generally characterized by good water quality and good biological condition. Total iron levels appeared characteristic of mine drainage influences; however, no impacts were detectable in the biological community condition.

10. 05030201-053

Sunfish Creek

RM 7.6 - Mouth

EXCEPTIONAL

Rationale:

The fish community in this segment of Sunfish Creek (excluding the area influenced by Ohio River backwater) exhibited a high species diversity and composite index values in the exceptional range. Water quality was characterized as good.

STATION NUMBER C02S43
 39 56 17.0 080 59 29.0 2
 BEND FORK AT TWP. RD. 101 (RM 3.6)
 OHIO RIVER 052100 (CAPTINA CREEK)
 MILES 0953.80 0871.82 018.02 003.60

PARAMETER			R	NO	MEAN	STAN DEV	MAXIMUM	MINIMUM	BEG	END
WATER	TEMP	CENT		9	18.5000	3.77492	24.0000	12.5000	83/07	83/10
CNDUCTVY	FIELD	MICROMHO		8	341.000	39.1772	390.000	278.000	83/07	83/10
CNDUCTVY	AT 25C	MICROMHO		9	396.000	40.9268	444.000	322.000	83/07	83/10
INTNSVE	SURVEY	IDENT		6	833909	.000000	833909	833909	83/07	83/10
DO	PROBE	MG/L		9	9.67222	.854103	10.9000	7.85000	83/07	83/10
BOD	5 DAY	MG/L	K	3	1.00000	.000000	1.00000	1.00000	83/07	83/08
COD	LOWLEVEL	MG/L		3	17.3333	5.50760	21.0000	11.0000	83/07	83/08
			K	1	10.0000		10.0000	10.0000	83/08	83/08
			T	4	15.5000	5.80230	21.0000	10.0000	83/07	83/08
PH		SU		8	8.13749	.226428	8.40000	7.70000	83/07	83/10
LAB	PH	SU		3	8.08000	.141490	8.23000	7.95000	83/07	83/08
T ALK	CAC03	MG/L		9	136.222	6.62971	145.000	126.000	83/07	83/10
RESIDUE	TOTAL	MG/L		6	310.000	45.1132	376.000	262.000	83/08	83/10
RESIDUE	TOT NFLT	MG/L		6	33.5000	30.0716	85.0000	6.00000	83/08	83/10
			K	1	5.00000		5.00000	5.00000	83/07	83/07
			T	7	29.4286	29.4893	85.0000	5.00000	83/07	83/10
NH3+NH4-	N TOTAL	MG/L		1	.240000		.240000	.240000	83/08	83/08
			K	8	.050000	.000052	.050000	.050000	83/07	83/10
			T	9	.071111	.063333	.240000	.050000	83/07	83/10
NO2-N	TOTAL	MG/L		2	.025000	.007071	.030000	.020000	83/07	83/08
			K	6	.020000	.000023	.020000	.020000	83/07	83/10
			T	8	.021250	.003536	.030000	.020000	83/07	83/10
NO3-N	TOTAL	MG/L		8	1.58000	4.01306	11.5000	.050000	83/07	83/10
			K	1	.100000		.100000	.100000	83/09	83/09
			T	9	1.41555	3.78615	11.5000	.050000	83/07	83/10
TOT KJEL	N	MG/L		9	.400000	.223607	.800000	.200000	83/07	83/10
PHOS-TOT		MG/L P		4	.152500	.085391	.270000	.080000	83/07	83/09
			K	5	.050000	.000061	.050000	.050000	83/07	83/10
			T	9	.095555	.075185	.270000	.050000	83/07	83/10
TOT HARD	CAC03	MG/L		6	196.500	5.85662	203.000	189.000	83/07	83/09
CALCIUM	CA-TOT	MG/L		9	57.2999	2.53838	60.3000	52.7000	83/07	83/10
MGNSIUM	MG, TOT	MG/L		9	12.3111	1.19529	13.7000	10.2000	83/07	83/10
CHLORIDE	TOTAL	MG/L		7	9.12857	3.45579	14.0000	3.00000	83/07	83/10
SULFATE	SO4-TOT	MG/L		7	65.1000	15.5662	86.7000	45.0000	83/07	83/10
CADMIUM	CD, TOT	UG/L	K	1	.500000		.500000	.500000	83/08	83/08
CHROMIUM	CR, TOT	UG/L	K	2	30.0000	.000000	30.0000	30.0000	83/07	83/08
COPPER	CU, TOT	UG/L	K	2	10.0000	.000000	10.0000	10.0000	83/08	83/08
IRON	FE, TOT	UG/L		7	1035.00	1159.26	3550.00	290.000	83/07	83/10
LEAD	PB, TOT	UG/L		1	2.00000		2.00000	2.00000	83/08	83/08
			K	1	2.00000		2.00000	2.00000	83/07	83/07
			T	2	2.00000	.000000	2.00000	2.00000	83/07	83/08
MANGNESE	MN	UG/L		6	45.8333	30.8896	90.0000	20.0000	83/07	83/10
NICKEL	NI, TOTAL	UG/L	K	4	40.0000	.000000	40.0000	40.0000	83/07	83/08
ZINC	ZN, TOT	UG/L		3	13.3333	5.77352	20.0000	10.0000	83/08	83/09
			K	4	10.0000	.000000	10.0000	10.0000	83/07	83/10
			T	7	11.4286	3.77965	20.0000	10.0000	83/07	83/10
ALUMINUM	AL, TOT	UG/L		6	978.333	612.583	2040.00	310.000	83/08	83/10
			K	1	500.000		500.000	500.000	83/07	83/07
			T	7	910.000	587.708	2040.00	310.000	83/07	83/10
RESIDUE	DISS-180	C MG/L		7	260.286	18.7069	282.000	228.000	83/07	83/10

STATION NUMBER C02S44
 39 58 00.0 081 02 10.0 2
 BEND FORK AT TWP. RD. 192 (RM 8.4)
 OHIO RIVER 052100 (CAPTINA CREEK)
 MILES 0953.80 0871.82 018.02 008.40

PARAMETER			R	NO	MEAN	STAN DEV	MAXIMUM	MINIMUM	BEG	END
WATER	TEMP	CENT		6	18.9167	3.77388	23.0000	13.0000	83/07	83/10
CNDUCTVY	FIELD	MICROMHO		5	418.000	47.8748	495.000	372.000	83/07	83/10
CNDUCTVY	AT 25C	MICROMHO		6	454.000	51.1742	511.000	385.000	83/07	83/10
INTNSVE	SURVEY	IDENT		6	833909	.000000	833909	833909	83/07	83/10
DO	PROBE	MG/L		6	8.24166	.855845	9.20000	7.10000	83/07	83/10
BOD	5 DAY	MG/L		1	1.40000		1.40000	1.40000	83/08	83/08
			K	2	1.00000	.000000	1.00000	1.00000	83/07	83/08
			T	3	1.13333	.230940	1.40000	1.00000	83/07	83/08
				3	16.0000	1.00000	17.0000	15.0000	83/07	83/08
COD	LOWLEVEL	MG/L		6	7.89999	.212408	8.25000	7.60000	83/07	83/10
PH		SU		3	7.99999	.114320	8.08000	7.87000	83/07	83/08
LAB	PH	SU		5	139.000	35.5176	198.000	102.000	83/07	83/09
T ALK	CAC03	MG/L		5	363.600	11.0877	374.000	346.000	83/08	83/10
RESIDUE	TOTAL	MG/L		6	43.8333	23.7775	87.0000	22.0000	83/07	83/10
RESIDUE	TOT NFLT	MG/L		2	.060000	.014142	.070000	.050000	83/08	83/09
NH3+NH4-	N TOTAL	MG/L	K	4	.050000	.000050	.050000	.050000	83/07	83/10
			T	6	.053333	.008165	.070000	.050000	83/07	83/10
				3	.020000	.000000	.020000	.020000	83/08	83/10
NO2-N	TOTAL	MG/L	K	2	.020000	.000000	.020000	.020000	83/07	83/08
			T	5	.020000	.000020	.020000	.020000	83/07	83/10
				6	.823333	.368439	1.41000	.290000	83/07	83/10
NO3-N	TOTAL	MG/L		6	.466666	.121107	.600000	.300000	83/07	83/10
TOT KJEL	N	MG/L		6	.426666	.224738	.800000	.180000	83/07	83/10
PHOS-TOT		MG/L P		5	199.000	7.34847	207.000	189.000	83/07	83/09
TOT HARD	CAC03	MG/L		6	58.6999	2.07459	61.4000	56.3000	83/07	83/10
CALCIUM	CA-TOT	MG/L		6	13.1000	.732211	13.9000	11.8000	83/07	83/10
MGNSIUM	MG,TOT	MG/L		6	15.8333	4.32882	21.2000	9.50000	83/07	83/10
CHLORIDE	TOTAL	MG/L		6	74.5000	10.9316	85.0000	55.0000	83/07	83/10
SULFATE	SO4-TOT	MG/L		3	.500000	.000000	.500000	.500000	83/07	83/08
CADMIUM	CD,TOT	UG/L	K	2	30.0000	.000000	30.0000	30.0000	83/07	83/08
CHROMIUM	CR,TOT	UG/L	K	3	10.0000	.000000	10.0000	10.0000	83/07	83/08
COPPER	CU,TOT	UG/L	K	6	1698.33	854.646	3360.00	1030.00	83/07	83/10
IRON	FE,TOT	UG/L		1	3.00000		3.00000	3.00000	83/08	83/08
LEAD	PB,TOT	UG/L	K	2	2.00000	.000000	2.00000	2.00000	83/07	83/08
			T	3	2.33333	.577352	3.00000	2.00000	83/07	83/08
				6	131.667	38.0352	200.000	100.000	83/07	83/10
MANGNESE	MN	UG/L		4	40.0000	.000000	40.0000	40.0000	83/07	83/08
NICKEL	NI,TOTAL	UG/L	K	4	12.5000	2.88675	15.0000	10.0000	83/08	83/09
ZINC	ZN,TOT	UG/L	K	2	10.0000	.000000	10.0000	10.0000	83/07	83/10
			T	6	11.6667	2.58200	15.0000	10.0000	83/07	83/10
				5	1232.00	297.943	1610.00	910.000	83/07	83/10
ALUMINUM	AL,TOT	UG/L	K	1	200.000		200.000	200.000	83/08	83/08
			T	6	1060.00	498.518	1610.00	200.000	83/07	83/10
				6	306.833	23.3460	331.000	272.000	83/07	83/10
RESIDUE	DISS-180	C MG/L								

STATION NUMBER C02S45
 40 00 05.0 081 02 55.0 2
 BEND FK DST BETHESDA- TWP RD 200 (RM 11.15)
 OHIO RIVER 052100 (CAPTINA CREEK)
 MILES 0953.80 0871.82 018.02 011.15

PARAMETER			R	NO	MEAN	STAN DEV	MAXIMUM	MINIMUM	BEG	END
WATER	TEMP	CENT		6	18.5000	3.08221	22.0000	14.0000	83/07	83/10
CNDUCTVY	FIELD	MICROMHO		5	546.800	72.2634	625.000	462.000	83/07	83/10
CNDUCTVY	AT 25C	MICROMHO		6	597.333	57.3480	672.000	536.000	83/07	83/10
INTNSVE	SURVEY	IDENT		6	833909	.000000	833909	833909	83/07	83/10
DO	PROBE	MG/L		6	6.84166	.717254	7.60000	6.00000	83/07	83/10
BOD	5 DAY	MG/L		3	3.56667	1.95021	5.80000	2.20000	83/07	83/08
COD	LOWLEVEL	MG/L		3	25.3333	4.61885	28.0000	20.0000	83/07	83/08
PH		SU		5	7.61000	.288217	8.00000	7.20000	83/07	83/10
LAB	PH	SU		3	7.72000	.096081	7.82000	7.63000	83/07	83/08
T ALK	CAC03	MG/L		5	129.400	51.1890	189.000	48.0000	83/07	83/10
RESIDUE	TOTAL	MG/L		5	435.400	29.0675	463.000	386.000	83/08	83/10
RESIDUE	TOT NFLT	MG/L		5	16.2000	12.3167	37.0000	6.00000	83/08	83/10
			K	1	5.00000		5.00000	5.00000	83/07	83/07
			T	6	14.3333	11.9276	37.0000	5.00000	83/07	83/10
NH3+NH4-	N TOTAL	MG/L		5	2.00600	.597643	2.84000	1.32000	83/08	83/10
			K	1	.050000		.050000	.050000	83/07	83/07
			T	6	1.68000	.960936	2.84000	.050000	83/07	83/10
				4	.265000	.114455	.380000	.110000	83/07	83/10
NO2-N	TOTAL	MG/L		6	3.37333	1.07413	5.10000	2.03000	83/07	83/10
NO3-N	TOTAL	MG/L		6	2.40000	.933808	3.50000	.700000	83/07	83/10
TOT KJEL	N	MG/L		6	2.39667	.638394	3.46000	1.66000	83/07	83/10
PHOS-TOT		MG/L P		5	223.600	5.85902	231.000	215.000	83/07	83/09
TOT HARD	CAC03	MG/L		6	65.2666	2.87174	70.1000	62.2000	83/07	83/10
CALCIUM	CA-TOT	MG/L		6	15.5000	.707107	16.3000	14.5000	83/07	83/10
MGNISIUM	MG,TOT	MG/L		6	32.4667	13.5212	50.0000	9.50000	83/07	83/10
CHLORIDE	TOTAL	MG/L		6	91.8333	11.3213	100.000	70.0000	83/07	83/10
SULFATE	SO4-TOT	MG/L		4	.500000	.000000	.500000	.500000	83/07	83/08
CADMIUM	CD,TOT	UG/L	K	3	30.0000	.000000	30.0000	30.0000	83/07	83/08
CHROMIUM	CR,TOT	UG/L	K	3	10.0000	.000000	10.0000	10.0000	83/07	83/08
COPPER	CU,TOT	UG/L	K	6	585.000	406.682	1290.00	240.000	83/07	83/10
IRON	FE,TOT	UG/L		1	3.00000		3.00000	3.00000	83/08	83/08
LEAD	PB,TOT	UG/L	K	3	2.00000	.000000	2.00000	2.00000	83/07	83/08
			T	4	2.25000	.500000	3.00000	2.00000	83/07	83/08
MANGNESE	MN	UG/L		6	193.333	53.0725	255.000	120.000	83/07	83/10
NICKEL	NI,TOTAL	UG/L	K	4	40.0000	.000000	40.0000	40.0000	83/07	83/08
ZINC	ZN,TOT	UG/L		2	15.0000	.000000	15.0000	15.0000	83/08	83/10
			K	4	10.0000	.000000	10.0000	10.0000	83/07	83/09
			T	6	11.6667	2.58200	15.0000	10.0000	83/07	83/10
ALUMINUM	AL,TOT	UG/L		5	672.000	358.288	1300.00	430.000	83/08	83/10
			K	1	500.000		500.000	500.000	83/07	83/07
			T	6	643.333	328.065	1300.00	430.000	83/07	83/10
RESIDUE	DISS-180	C MG/L		6	402.000	24.2652	420.000	358.000	83/07	83/10

HYDROLOGIC MEASUREMENTS
AND ANALYSIS

POWHATAN NO. 6 MINE
R-0360-2

As noted in Addendum No. 3, Seasonal Variations of Water Quality and Quantity, precipitation is the principal influencing factor upon all water systems. With an increase in precipitation or snowmelt, soil moisture will increase and cause a rise in the groundwater levels. Best conditions for groundwater recharge are those of prolonged rainfall periods. Most intensive percolation occurs as a consequence of winter precipitation and spring thaw. Amounts of available moisture in the soil will influence the chemical composition of groundwater. Dilution of dissolved solid contents increases during periods of natural recharge.

The following pages contain documentation of amounts of precipitation received in Ohio during 1986 and the first half of 1987. These measurements indicate the seasonal fluctuation which occurred in available moisture quantities. Fluctuations in water quality (total dissolved solids) can be inferred from increases or decreases in precipitation.

Jan

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OHIO DEPARTMENT OF
NATURAL RESOURCES

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Joseph J. Sommer
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JANUARY 1986

MONTHLY WATER INVENTORY REPORT FOR OHIO

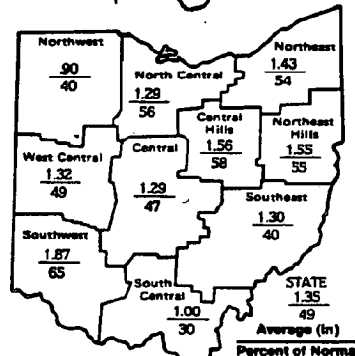
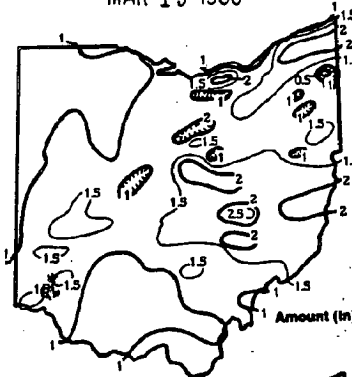
Compiled by Leonard J. Harstine and David H. Cashell

PRECIPITATION JANUARY 1986

PRECIPITATION for January was noticeably below normal throughout the state. The average for the state as a whole was 1.35 inches, 1.41 inches below normal. Regional averages ranged from 1.56 inches, 1.11 inches below normal, for the Central Hills region to 0.90 inch, 1.33 inches below normal, for the Northwest region. Regional departures from normal ranged from 2.29 inches below normal for the South Central region to 1.01 inches below normal for the Southeast region. Norwich, Muskingum County, reported the greatest amount of precipitation for the month, 2.90 inches, and Mosquito Creek Lake, Trumbull County, reported the least amount, 0.38 inch.

There was minimal precipitation during the first half of the month, mostly in the form of light snow flurries. The bulk of the month's precipitation came in the form of light rain during the remainder of the month. Generally, about 50 percent of the month's precipitation fell on the 19th. About 80 percent of the state received between 0.5 and 1.5 inches of precipitation; only a small area in the northeast and the east central portions received more than 2 inches. Chardon, Geauga County, reported 25.7 inches of snow for the month, the bulk of which fell the last half of the month. Snowfall for the season thus far at Chardon totals 61.5 inches, 88 percent of normal. The below-normal precipitation during the past two months has had no serious effect on the water supply situation. This January proved to be comparatively mild and serene.

Cumulative precipitation for the first four months of the 1986 water year remains above normal throughout the state. The average for the state as a whole is 15.49 inches, 5.23 inches above normal. Regional averages range from 17.53 inches, 7.16 inches above normal, for the Southeast region to 12.33 inches, 2.91 inches above normal, for the Northwest region.



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MONTHLY WATER INVENTORY REPORT FOR OHIO

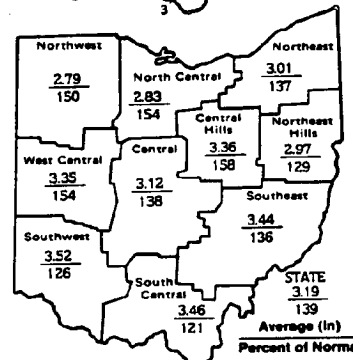
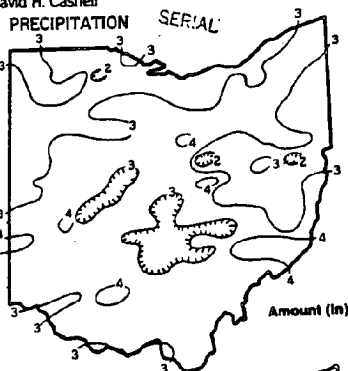
Compiled by Leonard J. Harstine and David H. Cashell

PRECIPITATION for February was noticeably above normal throughout the state. The average for the state as a whole was 3.19 inches, 0.90 inch above normal. Regional averages ranged from 3.52 inches, 0.72 inch above normal, for the Southwest region to 2.79 inches, 0.93 inch above normal, for the Northwest region. Departures from normal ranged from 1.24 inches above normal for the Central Hills region to 0.58 inch above normal for the South Central region. McConnesville, Morgan County, reported the greatest amount of precipitation for the month, 4.67 inches; New Carlisle, Clark County, reported 4.58 inches. Carrollton, Carroll County, reported the least amount, 1.68 inches.

There was precipitation in the form of light rain or snow during every week except in southeast Ohio where as much as 7 inches of snow fell on the 11th. The greatest amounts of precipitation were reported on the 4th, 6th and 21st. A major portion of the state received between 2.5 and 3.5 inches of precipitation. Only a few isolated stations scattered throughout the state received less than 2 inches or more than 4 inches. Snowfall at Chardon, Geauga County, totaled 9.6 inches, less than half that normally observed for February. However, southeast Ohio received unusually heavy snows during the month; Athens reported 17.6 inches, 13 inches above normal. This was a good month for recharge to water supplies.

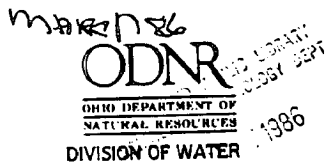
Cumulative precipitation for the first two months of the 1986 calendar year was generally below normal throughout the state; the only exception being the Central Hills region where precipitation was slightly above normal. The average for the state as a whole was 4.54 inches, 0.51 inch below normal. Regional averages ranged from 5.31 inches, 0.10 inch below normal, for the Southeast region to 3.69 inches, 0.40 inch below normal, for the Northwest region. Departures from normal ranged from 1.70 inches below normal for the South Central region to 0.13 inch above normal for the Central Hills region.

Cumulative precipitation for the first five months of the 1986 water year was noticeably above normal throughout the state; the major portion of this water year's precipitation came in November 1985. The average for the state as a whole was 18.68 inches, 6.13 inches above normal. Regional averages ranged from 20.97 inches, 8.07 inches above normal, for the Southeast region to 15.12 inches, 3.84 inches above normal, for the Northwest region. Although it has been an excellent season for recharge to water supplies thus far, the bulk of the season's recharge resulted from the excessive precipitation in November.



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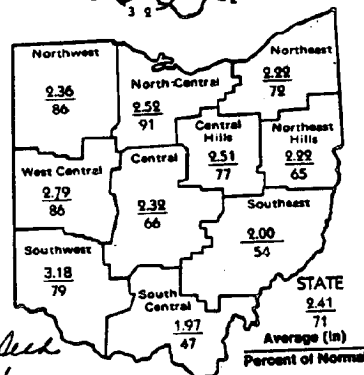
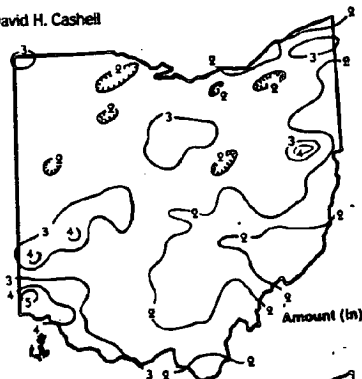
Compiled by Leonard J. Harstine and David H. Cashell

PRECIPITATION for March was noticeably below normal throughout the state. The average for the state as a whole was 2.41 inches, 1.00 inch below normal. Regional averages ranged from 3.18 inches, 0.85 inch below normal, for the Southwest region to 1.97 inches, 0.96 inches below normal, for the South Central region. The Southwest Ohio Water Company south of Venice, Hamilton County, reported the greatest amount of precipitation for the month, 5.57 inches, of which 2.25 inches fell on the 12th. Circleville, Pickaway County, reported the least amount for the month, 1.01 inches.

Moderate amounts of precipitation fell every week; the only exception was on the 12th when over 2 inches was observed at numerous stations in the southwest portion of the state. Generally, nearly two-thirds of the state received between 2 and 3 inches of precipitation. The southeast third received between 1 and 2 inches. Snowfall at Chardon, Geauga County, was only 8 inches, 40 percent of that usually observed for March; total for the season is 81.6 inches, 19.3 inches below normal. The below normal precipitation for March resulted in reduced recharge to ground-water supplies. This may have very well cut the recharge season short by at least a month, as conditions do not auger well for significant recharge to water supplies in the remaining month of the recharge season.

Cumulative precipitation for the first three months of the 1986 calendar year is noticeably below normal throughout the state. The average for the state as a whole is 6.95 inches, 1.51 inches below normal. Regional averages range from 8.00 inches, 2.06 inches below normal, for the Southwest region to 6.05 inches, 0.80 inch below normal, for the Northwest region. Departures from normal range from 3.96 inches below normal for the South Central region to 0.60 inch below normal for the Central Hills region.

Cumulative precipitation for the first six months of the 1986 water year continues to be markedly above normal throughout the state. However, the bulk of this surplus precipitation fell in November. The average for the state as a whole is 21.09 inches, 5.13 inches above normal. Regional averages range from 22.98 inches, 4.95 inches above normal, for the Southwest region to 17.48 inches, 3.44 inches above normal, for the Northwest region. Regional averages range from 6.69 inches above normal for the Central Hills region to 2.11 inches above normal for the South Central region.



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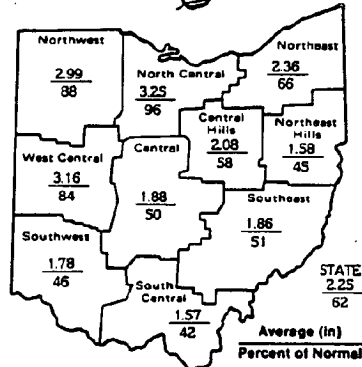
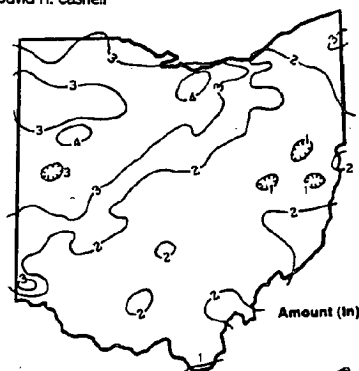
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PRECIPITATION for April was noticeably below normal throughout the state for the second consecutive month. The average for the state as a whole was 2.25 inches, 1.37 inches below normal. Regional averages ranged from 3.25 inches, 0.14 inch below normal, for the North Central region to 1.57 inches, 2.18 inches below normal, for the South Central region. Lima, Allen County, reported the greatest amount of precipitation for the month, 4.53 inches and Carrollton, Carroll County, reported the least amount, 0.33 inch, a record low for April for that station.

There was precipitation during every week; however, the bulk of the month's precipitation fell during the second and third weeks. Heaviest precipitation fell in the western and northern portions of the state. Generally, half of the state north of a line from Cincinnati through Delaware to Youngstown received from 2 to 4 inches and the remaining half south of this line received between 1 and 2 inches. Water supplies will be affected by the lack of recharge in both March and April as a result of the deficient precipitation. Although the effects are not significant at present, much depends on weather conditions during the next six months.

Cumulative precipitation for the first four months of the 1986 calendar year is below normal throughout the state. The average for the state as a whole is 9.20 inches, 2.88 inches below normal. Regional averages range from 10.62 inches, 1.29 inches below normal, for the West Central region to 8.00 inches, 6.14 inches below normal, for the South Central region. It is interesting to note that climatic conditions are very similar to those that existed for the first four months of 1985.

Cumulative precipitation for the first seven months of the 1986 water year continues to be noticeably above normal for most of the state; one exception is the South Central region where precipitation is slightly below normal. The average for the state as a whole is 23.34 inches, 3.76 inches above normal. Regional averages range from 24.83 inches, 4.57 inches above normal, for the Southeast region to 20.47 inches, 3.02 inches above normal, for the Northwest region. Departures from normal for the water year thus far range from 5.54 inches above normal for the North Central region to 0.07 inch below normal for the South Central region.



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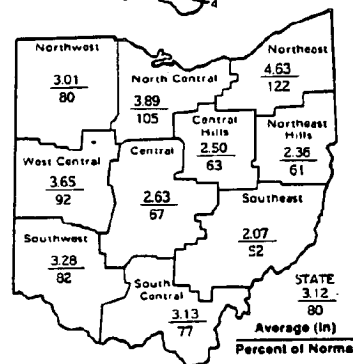
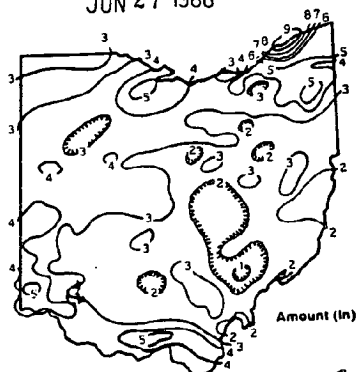
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PRECIPITATION for May was below normal throughout most of the state for the third consecutive month. Only the North Central and Northeast regions recorded precipitation above normal for the month. The average for the state as a whole was 3.12 inches, 0.79 inch below normal. Regional averages ranged from 4.53 inches, 0.82 inch above normal, for the Northeast region to 2.07 inches, 1.91 inches below normal, for the Southeast region. Painesville, Lake County, reported the greatest amount of precipitation for the month, 9.76 inches, of which 7.95 inches fell on four days—May 6, 7, 16 and 19. Amesville, Athens County, reported the least amount for the month 0.91 inch.

There were substantial amounts of precipitation during every week of the month at scattered points throughout the state. The bulk of the month's rain fell on the 6th, 7th, 16th, 19th and 27th. Generally, half of the state north of a line running from Cincinnati through Columbus to Youngstown received between 3 to 5 inches with 5 to 9.76 inches in the extreme northeast corner. The remaining half south of this line received between 1 to 3 inches. Stations in the northeast reported as much as 2.70 inches in a 24-hour period. However, in the South Central and Southeastern portion of the state continued dry conditions are beginning to put considerable stress on the water supply situation.

Cumulative precipitation for the first five months of the 1986 calendar year continues to be below normal throughout the state. The average for the state as a whole is 12.32 inches, 3.67 inches below normal. Regional averages range from 14.27 inches, 1.61 inch below normal, for the North Central region to 10.68 inches, 5.19 inches below normal, for the Northeast Hills region. Other regions showing excessive departures from normal for the calendar year thus far are: Central, 5.06 inches below normal; South Central, 7.08 inches below normal; and Southeast, 5.51 inches below normal.

Cumulative precipitation for the first eight months of the 1986 water year remains above normal throughout most of the state; one exception is the South Central region where it is below normal. The average for the state as a whole is 26.46 inches, 2.97 inches above normal. Regional averages range from 28.86 inches, 5.08 inches above normal, for the Northeast region to 23.48 inches, 2.29 inches above normal, for the Northwest region. Departures from normal range from 5.72 inches above normal for the North Central region to 1.01 inches below normal for the South central region.



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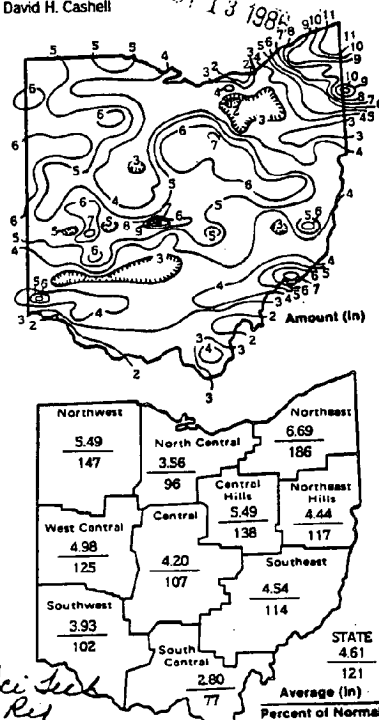
PRECIPITATION for June was noticeably above normal for most areas of the state; exceptions were in the North Central and South Central regions where it was below normal. Precipitation has been above normal for the state in only two months this year. The average for the state as a whole was 4.61 inches, 0.79 inch above normal. Regional averages ranged from 6.69 inches, 3.09 inches above normal, for the Northeast region to 2.80 inches, 0.84 inch below normal, for the South Central region. Andover, Ashtabula County, reported the greatest amount of precipitation for the month, 11.11 inches; Ashtabula reported 11.00 inches and Youngstown Airport reported 10.66 inches. Salem Center, Meigs County, reported the least amount, 1.13 inches.

There were substantial amounts of precipitation during every week of the month in most areas of the state. The bulk of the precipitation was produced by heavy, localized thunderstorms; greater amounts resulted from very intensive storms. One of the most intensive storms was reported in Wyandot and Crawford counties where Robert Stuckey reported 5.5 inches in 3 hours about 1 mile east of Upper Sandusky at the corner of State Route 30 and County Road 34.

The heavy rains in the northeast resulted in considerable flooding in Ashtabula County, which was designated a disaster area by Gov. Celeste. Generally, about one-third of the state south of a line running from Cincinnati through Columbus to East Liverpool received less than 4 inches for the month. Thus, the southern portions of the state continue to be noticeably deficient in precipitation for the year. The above normal precipitation was generally most beneficial to both agriculture and water supplies.

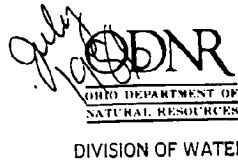
Cumulative precipitation for the first six months of the 1986 calendar year continues to be noticeably below normal for most areas of the state; the only exception is the Northeast region where precipitation is above normal. The average for the state as a whole is 16.93 inches, 2.88 inches below normal. Regional averages range from 20.34 inches, 1.43 inches above normal, for the Northeast region to 13.93 inches, 7.92 inches below normal, for the South Central region.

Cumulative precipitation for the first nine months of the 1986 water year continues to be noticeably above normal for most of the state; one exception is the South Central region where it is below normal. The average for the state as a whole is 31.07 inches, 3.76 inches above normal. Regional averages range from 35.55 inches, 8.17 inches above normal, for the Northwest region to 27.69 inches, 1.85 inches below normal, for the South Central region.



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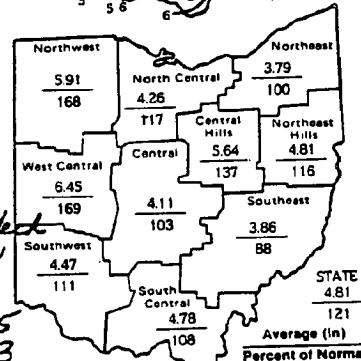
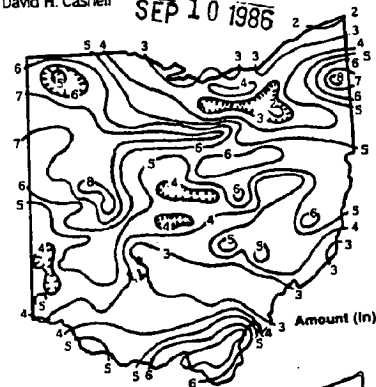
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PRECIPITATION for July was above normal for the second consecutive month for most areas of the state; the only exception was the Southeast region where precipitation was below normal. The average for the state as a whole was 4.81 inches, 0.83 inch above normal. Regional averages ranged from 6.45 inches, 2.64 inches above normal, for the West Central region to 3.79 inches, 0.01 inch above normal, for the Northeast region; the Southeast region with 3.86 inches was 0.52 inch below normal. Mansfield Airport, Richland County, reported the greatest amount of precipitation for the month, 8.56 inches and the Akron city station reported the least amount, 1.45 inches.

The bulk of the month's precipitation fell during the first 16 days although isolated areas in the northwest, northeast and southern portions of the state received small amounts of rain the last week. The greatest portion of the month's rain fell on the 1st, 9th, 11th and 12th in typical heavy, summer-type thunderstorms. The precipitation in the first half of the month was most beneficial to both agriculture and water supplies in most areas. However, areas in the southern half of the state continue to be noticeably dry. Even so, deficiencies in general have not reached drought proportions as compared to previous drought periods.

Cumulative precipitation for the seven months of the 1986 calendar year continues to be below normal for the central and southern portions of the state; the northern portion continues to be above normal. The average for the state as a whole is 21.74 inches, 2.05 inches below normal. Regional averages range from 25.70 inches, 2.04 inches above normal, for the West Central region to 18.71 inches, 7.57 inches below normal, for the South Central region.

Cumulative precipitation for the 10 months of the 1986 water year continues to be noticeably above normal throughout most of the state; the only exception is in the South Central portion where cumulative precipitation has been below normal for the past four months. The average for the state as a whole is 35.88 inches, 4.59 inches above normal. Regional averages range from 39.34 inches, 8.18 inches above normal, for the Northeast region to 32.67 inches, 1.50 inches below normal, for the South Central region.



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PRECIPITATION
JULY 1986

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AUGUST 1986

MONTHLY WATER INVENTORY REPORT FOR OHIO

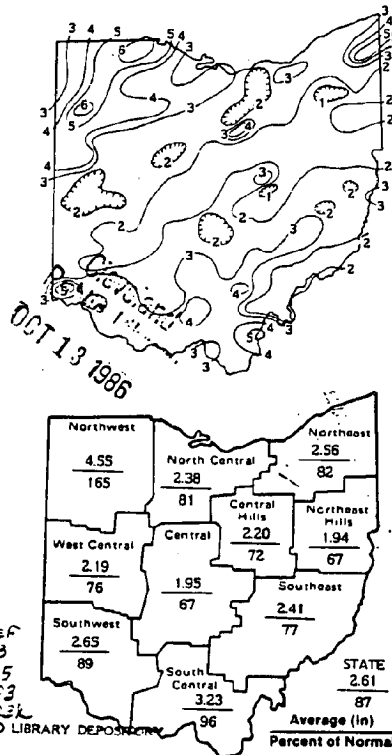
Compiled by Leonard J. Harstine and David H. Cashell

PRECIPITATION for August was below normal throughout most of the state; the only exception was the Northwest region where precipitation was noticeably above normal. The average for the state as a whole was 2.61 inches, 0.39 inch below normal. Regional averages ranged from 4.55 inches, 6.79 inches above normal, for the Northwest region to 1.94 inches, 0.95 inch below normal, for the Northeast Hills region. Maumee State Forest near Swanton, Fulton County, reported the greatest amount of precipitation for the month, 6.79 inches and Kirwan Dam near Ravenna, Portage County, reported the least amount, 0.59 inch.

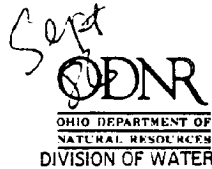
Although there was precipitation somewhere in the state during every week of the month, it was rather thin and widely scattered. Only a few widely scattered, heavy thunderstorms, which produced more than one-half inch of precipitation, were observed. Generally, most of the precipitation occurred the night of the 26th-27th when 1.0 inch or more fell throughout most areas of the state. The lack of precipitation during the month has begun to create some problems for water supplies in areas where the sources of water are marginal to begin with. Reports of reservoirs reaching critical low levels have been received, especially in the southeastern portion of the state where precipitation deficiencies are the greatest.

Cumulative precipitation for the 1986 calendar year continues to be below normal throughout the state; the only exceptions are in the Northwest, Northeast and West Central regions where it has been above normal for the past two months. The average for the state as a whole is 24.35 inches, 2.44 inches below normal. Regional averages range from 28.00 inches, 4.00 inches above normal, for the Northwest region to 21.50 inches, 5.65 inches below normal, for the Central region. Departures from normal for the calendar year range from 4.00 inches above normal for the Northwest region to 7.72 inches below normal for the South Central region.

Cumulative precipitation for the 1986 water year thus far remains above normal for most of the state; the only exception is the South Central region where it is below normal. The average for the state as a whole is 38.49 inches, 4.20 inches above normal. Regional averages range from



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SEPTEMBER 1986

MONTHLY WATER INVENTORY REPORT FOR OHIO

Compiled by Leonard J. Harstine and David H. Cashell
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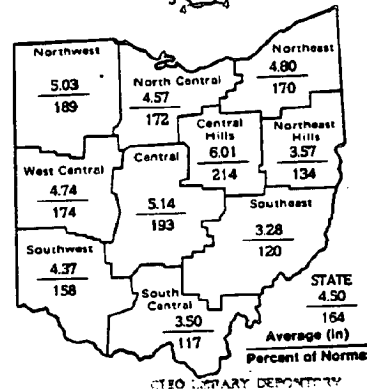
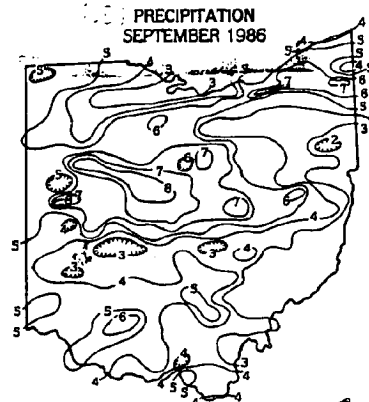
PRECIPITATION for September reached well above normal throughout the state. The average for the state as a whole was 4.50 inches, 1.75 inches above normal. Regional averages ranged from 6.01 inches, 3.02 inches above normal, for the Central Hills region to 3.28 inches, 0.55 inch above normal, for the Southeast region. LaRue, Marion County, reported the greatest amount of precipitation for the month, 8.64 inches and North Georgetown, Columbiana County, reported the least amount, 1.66 inches.

Substantial amounts of precipitation fell during every week of the month in most areas of the state. Storms producing more than one inch of rainfall occurred during the first, second and fourth week of the month in many areas of the state. However, a large portion of the eastern and southeastern areas along the Ohio River received less than 3.0 inches for the month. Although these rains helped to relieve some of the water problems in this area during the past several months, the water supply situation still remains serious for a few isolated cases. A large area in the central section of the state north of Dayton and Columbus received between 6.0 and 8.74 inches. About two-thirds of the state received more than 5.0 inches of rainfall for the month. Although the abundant precipitation during the month helped water supplies, it may create problems for fall harvesting.

Cumulative precipitation for the 1986 calendar year thus far is above normal in the five northern regions while it is below normal in the five southern and eastern regions. Cumulative precipitation for the state as a whole is 28.85 inches, 0.69 inches below normal. Regional averages range from 33.03 inches, 6.37 inches above normal, for the Northwest region to 25.33 inches, 5.62 inches below normal, for the Southeast region; the South Central region shows the greatest departure for the calendar year, 7.21 inches below normal.

Precipitation for the 1986 water year, which began Oct. 1, 1985, and ended Sept. 30, 1986, was above normal throughout the year for most areas of the state. This was generally due to the record-breaking precipitation in November 1985. The average for the state as a whole was 42.99 inches, 5.95 inches above normal. Regional averages ranged from 46.70 inches, 9.60 inches above normal, for the Northwest region to 39.40 inches, 1.14 inches below normal, for the Southeast region. Mansfield, Richland County, reported the greatest amount of precipitation for the water year, 62.54 inches and Amesville, Athens County, reported the least amount, 31.02 inches. An isohyetal map and regional averages and departures from normal for the 1986 water year appear on the back page of this report.

The water supply situation showed marked improvement during the first three months of the 1986 water year. This was primarily a result of the all-time record-breaking precipitation in November. Although precipitation was below normal during the remaining three



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OCTOBER 1986

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MONTHLY WATER INVENTORY REPORT FOR OHIO

Compiled by Leonard J. Harstine and David H. Cashell

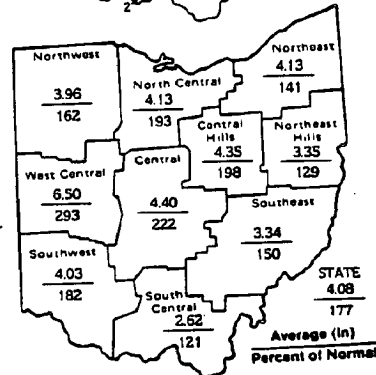
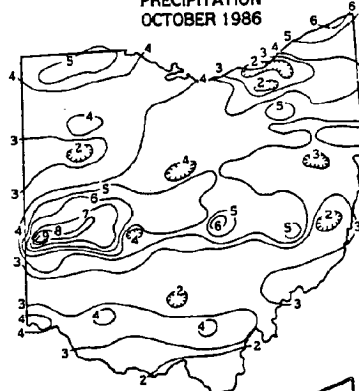
PRECIPITATION for October was noticeably above normal throughout the state. This is the second consecutive month in which precipitation has been well above normal. The average for the state as a whole was 4.08 inches, 1.77 inches above normal. Regional averages ranged from 6.50 inches, 4.28 inches above normal, for the West Central region to 2.62 inches, 0.46 inch above normal, for the South Central region. West Manchester, Preble County, reported the greatest amount of precipitation for the month, 9.88 inches, and Barkcamp State Park, Belmont County, reported the least amount, 1.06 inches.

Substantial amounts of precipitation fell in most areas of the state during October; for the west central and central areas it was excessive. The bulk of the month's rainfall fell during the first five days. During this period, the central portion received about 4.5 inches while the west central portion reported 4 to 8 inches. While there was no serious flooding, these heavy rains produced some record-high streamflows for October. About one-half of the state received between 4 to 8 inches of precipitation for the month. A wide band across the southern portion received between 2 and 3 inches while a few scattered areas received between 1 and 2 inches. The excessive precipitation has been most beneficial for water supplies throughout the state.

Cumulative precipitation for the 1986 calendar year thus far is generally above normal in the northern half of the state and below normal in the southern half. The average for the state as a whole is 32.93 inches, 1.08 inches above normal. Regional averages range from 39.13 inches, 7.63 inches above normal, for the West Central region to 28.06 inches, 6.75 inches below normal, for the South Central region.

This is the first month of the 1987 water year which began Oct. 1, 1986, and ends Sept. 30, 1987. The water year is a common reference period for both surface and ground-water supplies. October is generally considered the beginning of the new recharge season for water supplies. The above normal precipitation in both September and October should help to begin the new recharge season in excellent shape.

PRECIPITATION
OCTOBER 1986



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MONTHLY WATER INVENTORY REPORT FOR OHIO

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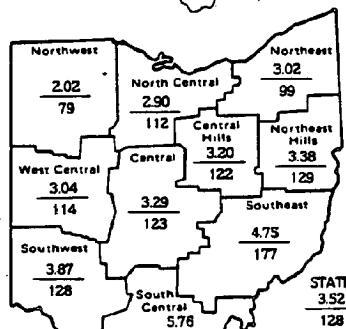
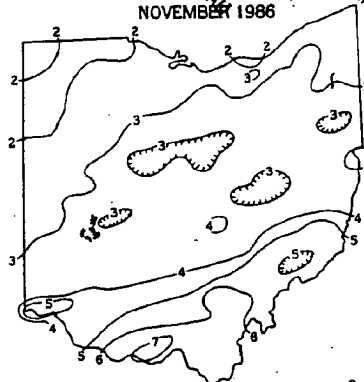
PRECIPITATION
NOVEMBER 1986

PRECIPITATION for November was above normal throughout most of the state; exceptions were in the Northwest and Northeast regions where it was below normal. This is the third consecutive month in which precipitation has been above normal. The average for the state as a whole was 3.52 inches, 0.78 inch above normal. Regional averages ranged from 5.76 inches, 2.89 inches above normal, for the South Central region to 2.02 inches, 0.54 inch below normal, for the Northwest region. Shawnee State Forest, Scioto County, reported the greatest amount of precipitation for the month, 7.26 inches, and Grover Hill, Paulding County, reported the least amount, 1.44 inches.

There was precipitation during every week of the month. Greatest amounts fell during the second and fourth weeks in the southern portion of the state, at which time more than one inch fell at many stations. Generally more than two-thirds of the state received between 3 and 6.5 inches of precipitation for the month; the remainder received between 1 and 3 inches. Precipitation was heaviest in the southern portion of the state diminishing to the north. The heavy precipitation in the southern portion was most beneficial to water supplies that had reached critical stages in some cases due to the persistent drought conditions.

Cumulative precipitation for the 1986 calendar year thus far is generally above normal in the northern portion of the state and below normal in the southern portion. The average for the state as a whole is 36.45 inches, 1.86 inches above normal. Regional averages range from 42.17 inches, 8.01 inches above normal, for the West Central region to 32.17 inches, 2.42 inches below normal, for the Northeast Hills region; the South Central and Southeast regions still remain 3.86 and 2.45 inches below normal respectively.

Cumulative precipitation for the first two months of the 1987 water year is above normal throughout the state. The average for the state as a whole is 7.60 inches, 2.55 inches above normal. Regional averages range from 9.54 inches, 4.66 inches above normal, for the West Central region to 5.98 inches, 0.97 inch above normal, for the Northwest region. The new water year is off to a good start with abundant precipitation.



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DECEMBER 1986

MONTHLY WATER INVENTORY REPORT FOR OHIO

Compiled by Leonard J. Harstine and David H. Cashell

PRECIPITATION for December was above normal for most of the state. Exceptions were in the Northwest and Southwest regions where precipitation was slightly below normal. The average for the state as a whole was 2.97 inches, 0.52 inch above normal. Regional averages ranged from 3.75 inches, 1.18 inches above normal, for the Southeast region to 1.71 inches, 0.47 inch below normal, for the Northwest region. Shawnee Forest, Scioto County, reported the greatest amount of precipitation for the month, 5.13 inches and Hicksville, Defiance County, reported the least amount, 1.47 inches.

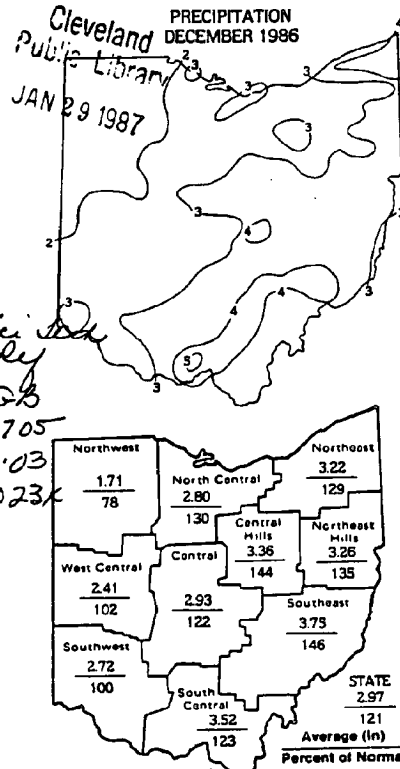
The bulk of the month's precipitation fell in the form of rain during the first week. Small amounts of rain fell during the remainder of the month, including in many cases only traces of snow. Thus, the last three weeks of the month were unusually dry. Snow for this December was sparse; even Chardon, the snow capital of Ohio, reported only 4.5 inches, 20 percent of normal. Generally, most areas of the state received the least amount of snow ever for the month. Generally, the eastern half of the state received 3 to 5 inches of precipitation while the western half received 1.5 to 3 inches. The above normal precipitation during the last week of November and the first week of December was most beneficial to water supplies.

Precipitation for the 1986 calendar year was generally above normal for the northern half of the state and below normal for the southern half. Precipitation for the calendar year averaged 39.42 inches, 2.38 inches above normal. Regional averages ranged from 44.58 inches, 8.06 inches above normal, for the West Central region to 35.43 inches, 1.58 inches below normal, for the Northeast Hills region. Mansfield Airport, Richland County, reported the greatest amount of precipitation for the year, 56.31 inches and North Georgetown, Columbiana County, reported the least amount, 27.37 inches. An isohyetal map and departures from normal appear on the last page of this report.

Precipitation was noticeably below normal throughout the state during the first six months and above normal during the last six months of the year. However, in the southern portion of the state, the above normal precipitation in the latter part of the year was not enough to overcome the noticeable deficiencies of the first six months. Drought conditions persisted late into the fall in the south central and southeastern portions of the state. For the most part, it was a good year for water supplies. Some water problems were experienced in the southeastern portion of the state during the late summer and early fall.

Cumulative precipitation for the first three months of the 1987 water year is above normal throughout the state. The average for the state as a whole is 10.57 inches, 3.07 inches above normal. Regional averages range from 11.95 inches, 4.71 inches above normal, for the

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JANUARY 1987

MONTHLY WATER INVENTORY REPORT FOR OHIO

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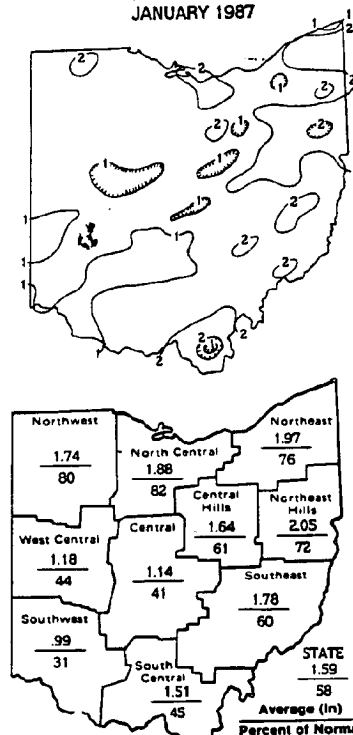
PRECIPITATION
JANUARY 1987

PRECIPITATION for January was noticeably below normal throughout the state. The average for the state as a whole was 1.59 inches, 1.17 inches below normal. Regional averages ranged from 2.05 inches, 0.78 inch below normal for the Northeast Hills region to 0.99 inch, 2.24 inches below normal, for the Southwest region. Chardon, Geauga County, reported the greatest amount of precipitation for the month, 2.72 inches and Milford, Clermont County, reported the least amount, 0.55 inch.

Precipitation was distributed fairly uniform throughout the state. Generally, amounts ranged between 1.5 and 2.5 inches, being lightest in the west, increasing toward the east where a few stations reported more than 2.5 inches. Minimal amounts of rain or snow were observed throughout the state during every week of the month. The only exception was in the northeast when amounts exceeded 1.0 inch on the 2nd and on the 19th when most areas of the state received 0.50 inch or more. As was the case for the past two months, the southeastern portion of the state which experienced drought conditions last year has received the greatest amount of precipitation for the month. Chardon, Geauga County, which reported the greatest amount of precipitation for the month, received 17.5 inches of snow, 6.5 inches below normal. This brings Chardon's snowfall for the 1987 season to 34.0 inches, only 55 percent of normal.

Although January's precipitation appears to be low, it was 0.24 inch more than was received in January 1986. Also, January's precipitation has been lower in 13 of the past 47 years, of which three years reported less than 1.0 inch. Although the deficient precipitation this January has not had a serious effect on the overall water supply situation thus far, it remains to be seen just what will develop during the remaining three months of the 1987 recharge season. It would be wise for those involved in water supplies to monitor their situations closely in the ensuing months and plan accordingly.

Cumulative precipitation for the first four months of the 1987 water year continues to be above normal throughout the state. The average for the state as a whole is 12.16 inches, 1.83 inches above normal. Regional averages range from 13.62 inches, 2.96 inches above normal, for the Southeast region to 9.43 inches, 0.22 inch above normal, for the Northwest region.



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FEBRUARY 1987

MONTHLY WATER INVENTORY REPORT FOR OHIO

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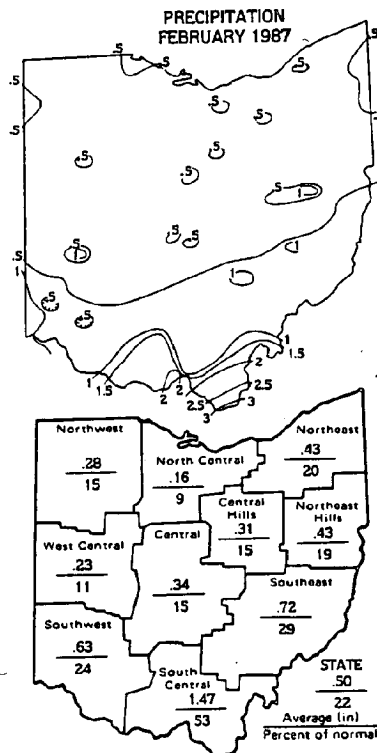
PRECIPITATION for February was noticeably below normal throughout the state. The average for the state as a whole was 0.50 inch, 1.74 inches below normal. Regional averages ranged from 1.47 inches, 1.31 inches below normal for the South Central region to 0.16 inch, 1.71 inches below normal for the North Central region. Departures from normal ranged from 1.31 inches below normal for the South Central region to 1.99 inches below normal for the Southwest region. Waterloo, Lawrence County, reported the greatest amount of precipitation for the month, 2.29 inches, and Grover Hill, Paulding County, reported the least amount—NONE! Also, St. Mary's, Auglaize County, and Montpelier, Williams County, reported only a trace. Note: an area in the extreme southern portion of the state probably received in excess of 3 inches as indicated by the 3.32 inches reported at Huntington Airport NOAA, West Virginia. Chardon, Geauga County, reported 7.3 inches of snow for the month, 36 percent of normal.

Precipitation was light during every week of the month. Stations in extreme south central Ohio and a few isolated stations reported more than 1 inch for the month. Only during storms on the 2nd, 12th, 18th and 28th did stations report more than .02 inch. Much of the precipitation at stations that reported in excess of 1 inch fell on the 28th of the month. Snowfall was extremely light throughout the state during the entire month with only stations in northeastern Ohio receiving significant amounts. This was the second driest February for the state as a whole in 105 years, with only .043 inch in February 1978 being lower. Many stations in northern Ohio reported record low amounts of precipitation for the month.

Cumulative precipitation for the 1987 calendar year thus far for the state as a whole is 2.09 inches, 2.91 inches below normal. Regional averages range from 1.41 inches, 3.37 inches below normal for the West Central region to 2.98 inches, 3.17 inches below normal for the South Central region. Departures from normal range from 2.00 inches below normal for the Northwest region to 4.23 inches below normal for the Southwest region.

Cumulative precipitation for the first five months of the 1987 water year for the state as a whole is 12.66 inches, 0.09 inch above normal. Regional averages range from 9.71 inches, 1.34 inches below normal for the Northwest region to 14.88 inches, 0.76 inch above normal for the South Central region.

Precipitation has been very light since the middle of December 1986. Rainfall during this period is very important for replenishment of ground-water and upground reservoir supplies. It is hoped that current conditions will not persist. Those involved in managing water supplies should monitor their situations closely and plan accordingly.



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MARCH 1987

MONTHLY WATER INVENTORY REPORT FOR OHIO

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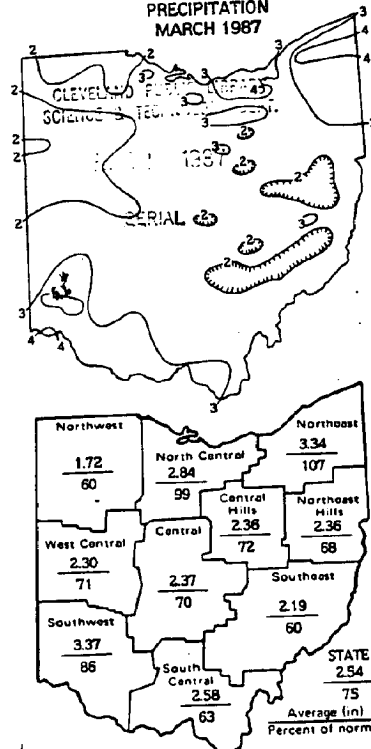
PRECIPITATION for March was below normal throughout the state except in the Northeast region where it was slightly above normal. The average for the state as a whole was 2.54 inches, 0.84 inch below normal. Regional averages ranged from 3.37 inches, 0.55 inch below normal for the Southwest region to 1.72 inches, 1.15 inches below normal for the Northwest region. Departures from normal ranged from 1.51 inches below normal for the South Central region to 0.23 inch above normal for the Northeast region. Kings Mills, Warren County, reported the greatest amount of precipitation for the month, 4.61 inches, and New Straitsville, Perry County, reported the least amount, 1.11 inches. Chardon, Geauga County, reported 4.60 inches for the month including 22.8 inches of snow which is 121 percent of normal snowfall. For the season, Chardon's total snowfall is 64.2 inches, 64 percent of normal.

The bulk of the month's precipitation occurred during storm periods on the 1st and 30th-31st. The rest of the month was very dry with amounts of less than 0.50 inch reported on the 14th-15th, 18th-19th, and 24th-25th. The storm on the 30th-31st was the most significant with stations generally reporting from 1 to 2 inches of precipitation. This storm also produced more snow than any other storm this winter for many stations. Most of the state received between 2 and 3 inches of precipitation. Areas in the northeast and southwest portions received more than 3 inches and a few stations more than 4 inches. Stations in the northwest and east central portions received less than 2 inches.

Cumulative precipitation for the 1987 calendar year thus far for the state as a whole is 4.63 inches, 3.75 inches below normal. Regional averages range from 5.74 inches, 2.13 inches below normal for the Northeast region to 3.71 inches, 4.33 inches below normal for the West Central region. Cumulative departures from normal are below normal for all regions ranging from 4.78 inches below normal for the Southwest region to 2.13 inches below normal for the Northeast region. It is significant to note that this was the 4th driest January, February and March for the state as a whole in 105 years with only 1941, 1958 and 1983 being drier.

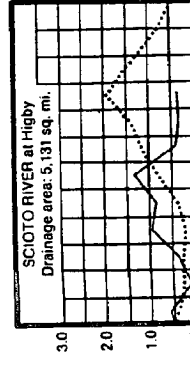
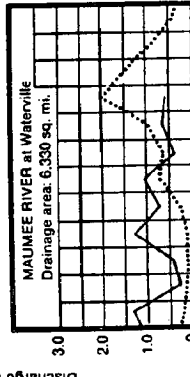
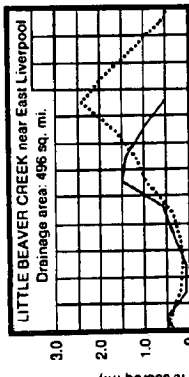
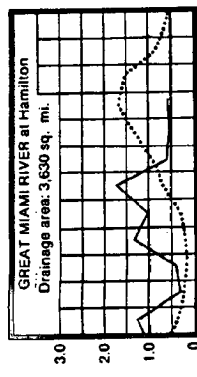
Cumulative precipitation for the first 6 months of the 1987 water year for the state as a whole is 15.20 inches, 0.75 inch below normal. Regional averages range from 17.46 inches, 0.75 inch below normal for the South Central region to 11.43 inches, 2.49 inches below normal for the Northwest region.

This is the third consecutive month that precipitation has been below normal. Although not critical at this time, we urge those involved in managing water supplies to monitor their situations closely and plan accordingly.

PRECIPITATION
MARCH 1987

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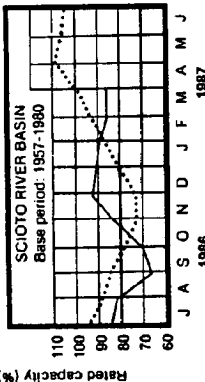
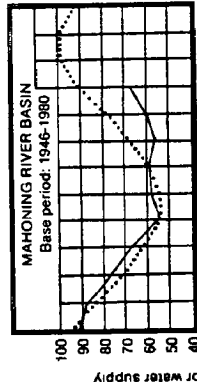
MEAN STREAM DISCHARGE



Base period for all stream: 1951-1980

Normal current

RESERVOIR STORAGE FOR WATER SUPPLY



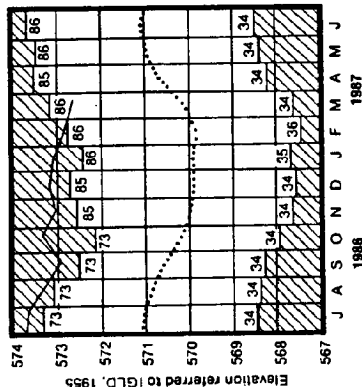
RESERVOIR STORAGE for water supply increased in the Mahoning River basin and was unchanged in the Scioto River basin. Reservoir storage remained below normal in both basins in response to below normal precipitation and runoff for the last three months. Storage has been below normal in the Mahoning River basin for the past three months and in the Scioto River basin for the past two months. Storage in the Mahoning River basin continues to be affected by the draining of Lake Milton for repairs to the dam.

Storage at the month's end for the Mahoning basin index reservoirs was 67 percent of rated capacity for water supply compared to 59 percent for last month and 83 percent for March 1986. Storage at the month's end for the Scioto basin index reservoirs was 85 percent of rated capacity for water supply compared to 85 percent for last month and 101 percent for March 1986.

STREAMFLOW for March was deficient statewide. In general, flows decreased steadily throughout the month after increasing for the first few days in response to the storm on February 28 and March 1. Flows began to increase rapidly on the 30th and 31st in response to the storm of the same dates. Little Beaver Creek recorded the third lowest mean monthly flow for the period of record for March.

Runoff continues to be noticeably below normal throughout the state with amounts ranging from 21 to 37 percent of normal for March. Cumulative runoff for the 1987 calendar year is also noticeably below normal. Cumulative runoff in inches per square mile and percent of normal for the first three months of the 1987 calendar year are: Great Miami River, 1.71 inches, 45 percent; Little Beaver Creek, 2.99 inches, 62 percent; Maumee River, 1.64 inches, 46 percent; and Scioto River, 1.11 inches, 28 percent.

LAKE ERIE LEVELS



Mean discharge and percent of normal for the index gaging stations for March were: Great Miami River, 2,264 cfs, 37 percent; Little Beaver Creek, 274 cfs, 23 percent; Maumee River, 3,781 cfs, 30 percent; and Scioto River, 1,863 cfs, 19 percent.

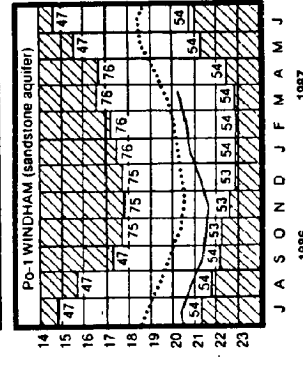
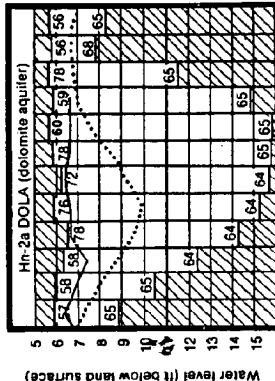
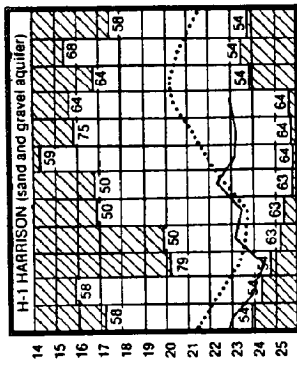
LAKE ERIE level for March declined during the month and did not set a new record high level for the first time since April 1986. Record high levels have been established repeatedly in 17 of the past 23 months. The below normal precipitation for the past three months has resulted in declining lake levels, whereas they normally have begun to rise in March.

The mean level for March was 572.69 feet (IGLD-1955), 0.47 foot below the March record high set in 1986, 4.09 feet above Low Water Datum, and 2.64 feet above normal.

GROUND-WATER LEVELS for March in general remained stable throughout the month in response to limited recharge. Ground-water levels range from 0.58 foot below to 0.41 foot above last month's levels. Although precipitation was below normal for March, amounts were enough to have a positive effect on the ground-water storage situation. In general, ground-water levels are from 0.50 to 3.50 feet below normal; exceptions are observation wells Fr-10, OSU Farms, Columbus and Hn-2A, Dola, Hardin County, which have been consistently above normal for the past several years.

The below normal precipitation for the past three months has had a noticeable effect on ground-water supplies. Ground-water levels should normally be rising rapidly in March. The storm on March 30 and 31 was beneficial; however, the full effect will not be determined until the end of April. Although the situation is not critical at this time, those who depend on ground-water for supplies should monitor their situations closely and plan accordingly.

GROUND-WATER LEVELS



Base periods: H-1, 1951-1979; Hn-2a, 1955-1979; Po-1, 1947-1979

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1987

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APRIL 1987

DIVISION OF WATER

MONTHLY WATER INVENTORY REPORT FOR OHIO

Compiled by Leonard J. Harstine and David H. Cashell

PRECIPITATION for April was generally below normal throughout most of the state for the fourth consecutive month; exceptions were in the eastern and southeastern portions of the state where it was slightly above normal. The average for the state as a whole was 2.92 inches, 0.59 inch below normal. Regional averages ranged from 4.05 inches, 0.31 inch above normal, for the South Central region to 1.54 inches, 1.77 inches below normal, for the Northwest region. Middlebourne, Guernsey County, reported the greatest amount of precipitation for the month, 5.87 inches and Bowling Green, Wood County, reported the least amount, 1.17 inches.

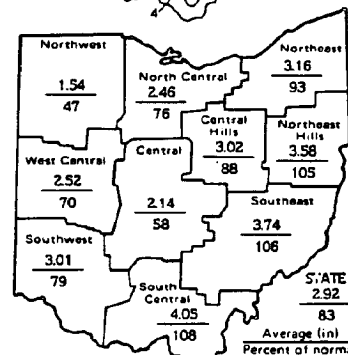
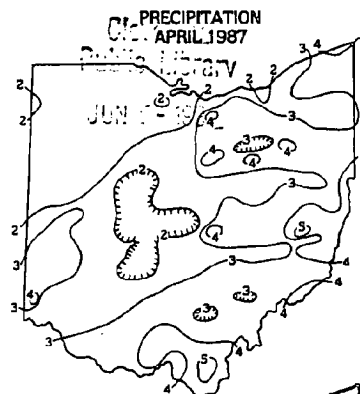
There was precipitation in most areas of the state during every week of the month. The bulk of the month's precipitation fell during the period April 3rd to 5th. During this period a large portion of the state experienced a severe snowstorm which produced record-breaking amounts of snow for a 24 hour period for many stations in the central and eastern areas of the state, and in many cases it was an all-time record 24 hour snowfall. Columbus reported 12.6 inches; Akron-Canton Airport, 20.6 inches; Chardon, 18 inches; New Philadelphia, 17 inches; Dillon Reservoir at Zanesville, 18 inches; these were all time records for a 24 hour period for these stations. The moisture from this storm along with precipitation throughout the month was beneficial to our water supplies.

Most of the state west of a line from Cincinnati to Cleveland received between 1.5 and 2.5 inches of precipitation for the month while east of this line precipitation amounts ranged from 2.5 to 3.5 inches, with a few stations reporting in excess of 4 inches and only one station reporting more than 5 inches. Generally, snowfall this winter was much below normal; Chardon, the snow capital of Ohio, reported 82.6 inches, 78 percent of normal.

Cumulative precipitation for the 1987 calendar year remains markedly below normal throughout the state. For most regions, precipitation has been below normal for every month in this calendar year. The average for the state as a whole is 7.55 inches, 4.34 inches below normal. Regional averages range from 9.61 inches, 4.37 inches below normal, for the South Central region to 5.28 inches, 4.92 inches below normal, for the Northwest region. Departures from normal range from 6.06 inches below normal, for the Central region to 2.36 inches below normal for the Northeast region.

Cumulative precipitation for the first 7 months of the 1987 water year remains below normal throughout most of the state; one exception is the North Central region where it is normal. The average for the state as a whole is 18.12 inches, 1.34 inches below normal. Regional averages range from 21.51 inches, 0.44 inch below normal, for the South Central region to 12.97 inches, 4.26 inches below

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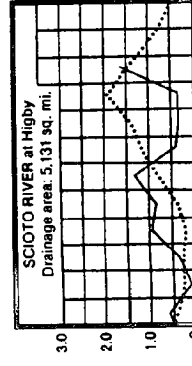
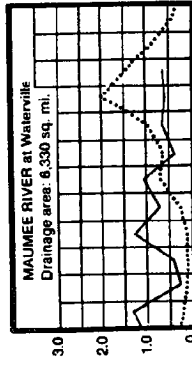
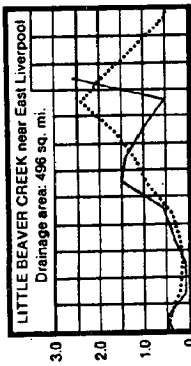
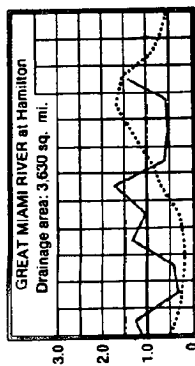


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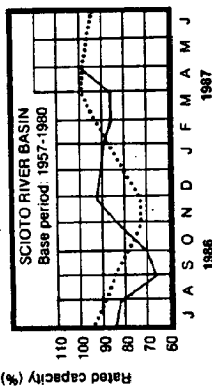
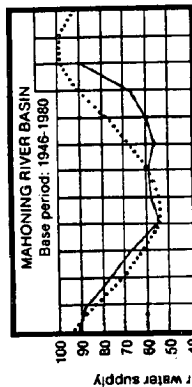
MEAN STREAM DISCHARGE



Base period for all stream: 1951-1980

Normal current —

RESERVOIR STORAGE FOR WATER SUPPLY



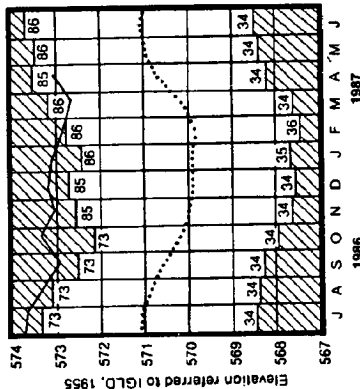
RESERVOIR STORAGE for water supply increased significantly in both the Mahoning River and the Scioto River basins. Storage remained slightly below normal in the Mahoning River basin while it was slightly above normal in the Scioto River basin. Storage at the month's end for the Mahoning basin index reservoirs was 69 percent of rated capacity for water supply compared to 67 percent for last month and 84 percent for April 1986. Storage at the month's end for the Scioto basin index reservoirs was 99 percent of rated capacity for water supply compared to 85 percent for last month and 96 percent for April 1986.

STREAMFLOW for April was generally normal throughout the state; the only exception was in the northwest where it continues to be deficient. Flows increased significantly in most areas of the state during the first half of the month in response to the increased runoff from snow melt and rain during the last two days of March and the first few days of April. An exception to this was in the northwest where streamflow continued to be noticeably deficient in response to below normal precipitation. Flows at the month's end were generally deficient for most areas of the state. Although there was some precipitation throughout the state during the second half of the month, most of it was lost to evaporation, evapotranspiration and soil moisture.

Mean discharge and percent of normal at the index gaging stations were: Great Miami River, 5.205 cfs, 93 percent; Little Beaver Creek, 1.291 cfs, 141 percent; Maumee River, 4.080 cfs, 43 percent; Scioto River, 7.893 cfs, 106 percent.

LAKE ERIE level at Cleveland for April rose during the month following a declining trend in both February and March. This is the

LAKE ERIE LEVELS



second consecutive month the lake level has not set a new record high. The mean level for April was 573.01 feet (IGLD-1955), 0.32 foot above last month's mean level, 0.35 foot below the level observed for April 1986 and 4.41 feet above Low Water Datum.

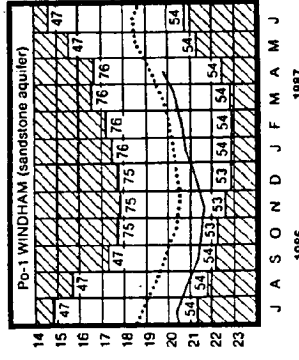
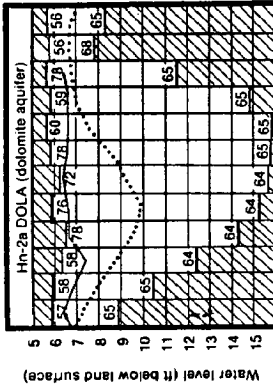
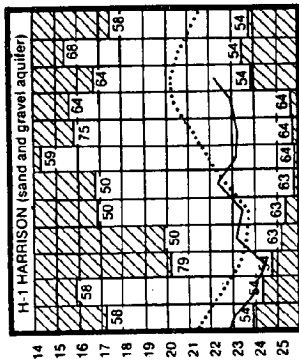
GROUND-WATER LEVELS for April generally showed rises in response to recharge from substantial amounts of precipitation during the last days of March and the first week of April. All the index wells showed net rises from last month's levels ranging from 0.1 foot to 0.9 foot. Ground-water levels were below those levels observed last year in most index observation wells; one exception was in northeast Ohio at Windham, where observation well Po-1, representing a consolidated aquifer, was noticeably above the level observed last year. Water levels are noticeably below normal in most areas of the state; the only exception is in consolidated aquifers in the northwest where water levels continue to be above normal in response to above normal precipitation during the past two or three years. Observation well Tu-1 at Strasburg, Tuscarawas County, set a new record low water level for April for the period beginning in 1962.

Ground-water storage showed some improvement over last month, but still continues to be dangerously low as far as water supplies are concerned. Unless we experience substantially greater than normal precipitation in May, the normal recharge season will have ended, and water levels will begin their usual summer declines.

SUMMARY

Precipitation for April was below normal throughout the state for the fourth consecutive month. Streamflow, reservoir storage and ground-water storage improved slightly in response to precipitation during the first week of the month. Lake Erie level declined slightly and was about 0.5 foot below the record high for April. The water supply situation holds some degree of uncertainty at this time.

GROUND-WATER LEVELS



Base periods: H-1, 1951-1979; Hn-2a, 1955-1979; Po-1, 1947-1979



DIVISION OF WATER

Richard F. Celeste
Governor

Joseph J. Sommer
Director



MAY 1987

MONTHLY WATER INVENTORY REPORT FOR OHIO

Compiled by Leonard J. Harstine and David H. Cashell

PRECIPITATION for May was noticeably below normal throughout most of the state; exceptions were in the Central and Central Hills regions where it was above normal for the first time this year. This is the fifth consecutive month for which precipitation has been below normal this year. The average for the state as a whole was 3.34 inches, 0.41 inch below normal. Regional averages range from 4.94 inches, 1.13 inches above normal, for the Central region to 2.27 inches, 1.26 inches below normal, for the Northeast region. Marion, Marion County, reported the greatest amount of precipitation for the month, 8.79 inches; West Manchester, Preble County, reported 7.69 inches and Mt. Gilead, Morrow County, reported 7.27 inches; Ashtabula, Ashtabula County, reported the least amount, 1.10 inches.

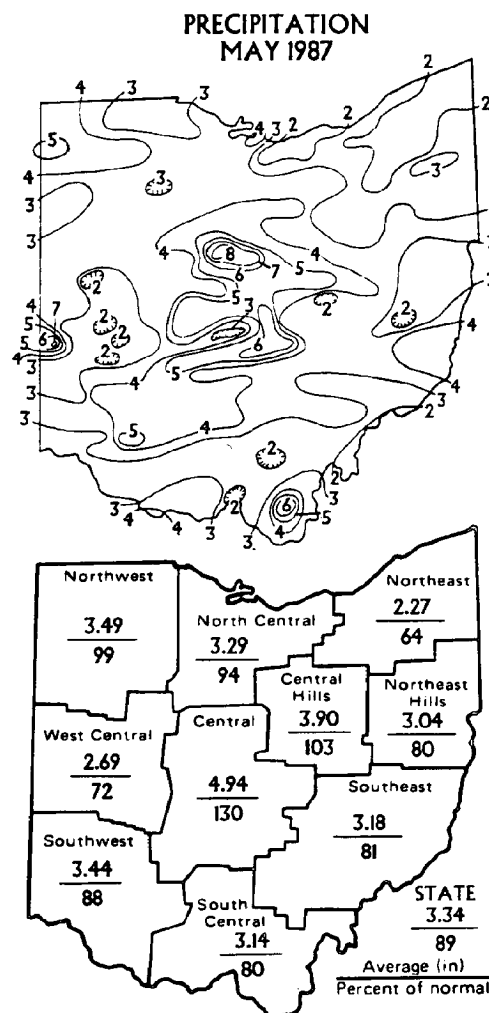
There were small amounts of precipitation during every week of the month in most areas of the state. However, the bulk of the month's precipitation fell during the last week of the month when heavy thunderstorms passed through the state on the 21st, 28th, 30th and 31st. It was reported that 4 inches fell during a one hour period on the 28th at Glendale, a suburb of Cincinnati. A heavy storm on the 21st resulted in serious local flooding and caused extensive damage in an area east of Ironton in Lawrence County. The area was declared a "Disaster Area" by the Federal Government at the request of Governor Celeste.

Generally, there was between 3 and 4 inches of precipitation in most areas of the state. Exceptions were in the northeast where from 1 to 3 inches were reported and in the central portion where between 5 and 7.27 inches were reported.

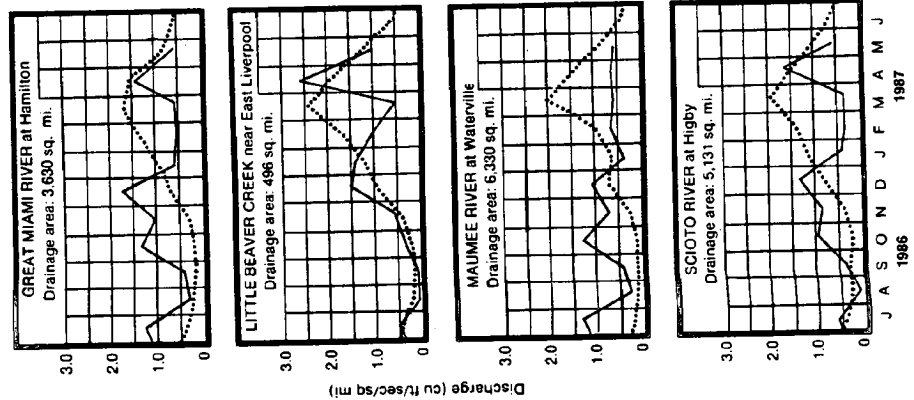
Cumulative precipitation for the first eight months of the 1987 calendar year remains noticeably below normal throughout the state. The average for the state as a whole is 10.89 inches, 4.75 inches below normal. Regional averages range from 12.75 inches, 5.16 inches below normal, for the South Central region to 8.77 inches, 4.97 inches below normal, for the Northwest region. Departures from normal range from 6.42 inches below normal for the West Central region to 3.16 inches below normal for the North Central region. The much below normal precipitation during the first five months of this year is beginning to have a noticeable effect on the state's water supply situation. It would be wise for those in charge of water supplies to monitor their situations closely and plan accordingly.

Cumulative precipitation for the first seven months of this 1987 water year continues to be below normal throughout the state. The average for the state as a whole is 21.46 inches, 1.75 inches below normal. Regional averages range from 24.65 inches, 1.23 inches below normal, for the South Central region to 16.46 inches, 4.31

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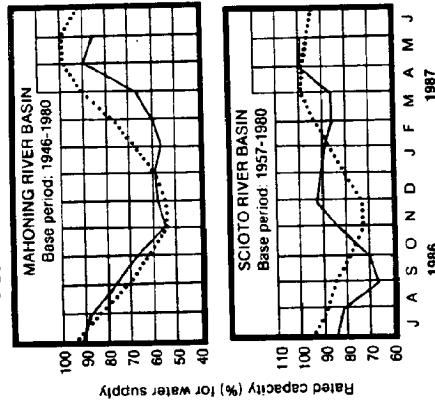


MEAN STREAM DISCHARGE



Base period for all stream: 1951-1980

RESERVOIR STORAGE FOR WATER SUPPLY

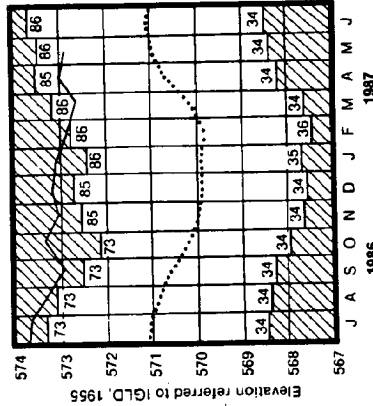


RESERVOIR STORAGE for May declined slightly in the Mahoning River basin and was unchanged in the Scioto River basin. Storage in the Mahoning River basin reservoirs was below normal as has been the case since January; this is due partly to the fact that Milton Reservoir is still drained for repairs. Storage in the Scioto River basin reservoirs is slightly above normal.

Reservoir storage at the month's end for the Mahoning basin index reservoirs was 86 percent of rated capacity for water supply compared to 89 percent for last month and 90 percent for May 1986. Storage at the month's end for the Scioto basin index reservoirs was 99 percent of rated capacity for water supply compared to the same for last month and 89 percent for May 1986.

STREAMFLOW for May showed noticeable declines in most areas of the state as a result of the much below normal precipitation during the first three weeks. Flows were below normal throughout the state for the month; however, flows increased sharply in the central and southern portion of the state in response to the heavy storms during the last week of the month. Mean discharge and percent of normal at the index gaging stations were: Great Miami River, 2,065 cfs, 67 percent; Little Beaver Creek, 489 cfs, 84 percent; Maumee River, 3,724 cfs, 74 percent; and Scioto River, 2,934 cfs, 62 percent. Cumulative runoff and departure from normal is: Great Miami River,

LAKE ERIE LEVELS at Cleveland

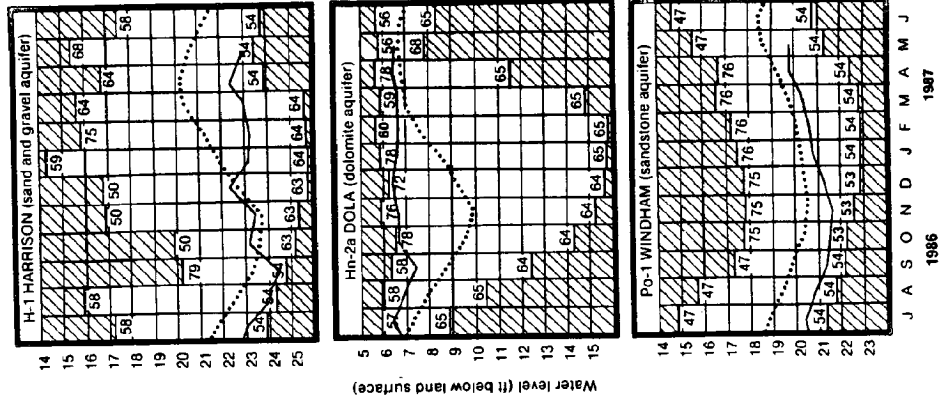


9.44 inches, 0.33 inch below normal; Little Beaver Creek, 9.97 inches, 1.53 inches below normal; Maumee River, 6.54 inches, 2.59 inches below normal, and Scioto River, 7.73 inches, 2.14 inches below normal.

LAKE ERIE LEVEL for May at Cleveland declined slightly whereas it usually continues to rise. The mean level for May was 572.87 feet (IGLD-1955), 0.14 foot below last month's mean level, 0.56 foot below the record level observed in May 1986, 1.95 feet above normal and 4.27 feet above Low Water Datum. Note: Lake Erie levels are now reported as the level at Cleveland, Ohio. All means and historical records are based on the long standing record at this location.

GROUND-WATER LEVELS for May generally showed marked declines due to the lack of recharge from the below normal precipitation of the past five months. Wells in the southern portion of the state rose during the last 10 days of the month in response to excess rain from heavy storms in the area. Net declines were generally greater than usual for May; key observation wells representing consolidated aquifers showed net rises in response to delayed recharge. Generally, water levels are noticeably below normal and below those levels observed in May 1986. Some wells in unconsolidated aquifers are near record low levels. These low levels in unconsolidated aquifers pose no immediate threat to water supplies at the present time; however, those depending on ground-water from wells yielding marginal supplies should monitor their wells closely and prepare for alternate supplies.

GROUND-WATER LEVELS



Base periods: H-1, 1951-1979; Hn-2a, 1955-1979; Po-1, 1947-1979



Richard F. Celeste
Governor

Joseph J. Sommer
Director



JUNE 1987

MONTHLY WATER INVENTORY REPORT FOR OHIO

Compiled by Leonard J. Harstine and David H. Cashell

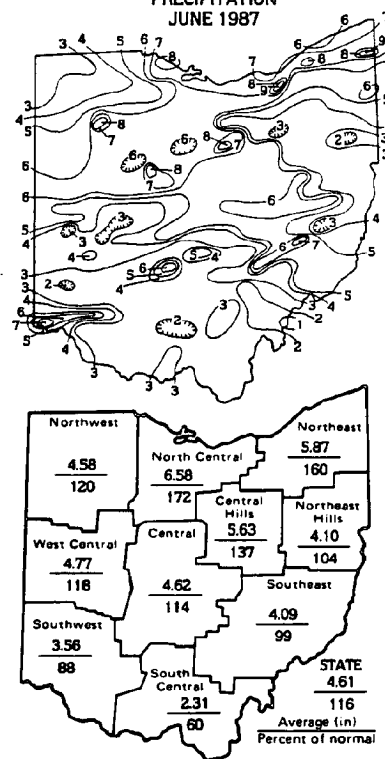
PRECIPITATION for June was above normal for the northern and central portions of the state and below normal for the southern portion. The average for the state as a whole was 4.61 inches, 0.65 inch above normal. This is the first month of the year that precipitation has been above normal for the state as a whole. Regional averages ranged from 6.58 inches, 2.76 inches above normal, for the North Central region to 2.31 inches, 1.57 inches below normal, for the South Central region. Andover, Ashtabula County, reported the greatest amount of precipitation for the month, 9.47 inches; Parma and North Royalton in the Cleveland Metro area also reported 9.31 and 9.23 inches respectively. Belleville Locks and Dam, Meigs County, reported the least amount, 0.76 inch.

Precipitation for the month was produced by scattered thunder-showers throughout the state. Moderate to heavy precipitation fell during every week of the month except for the south central and southeast areas where it was mostly moderate to light rains. Some rather heavy storms occurred during the first three days of the month in the northern portion of the state and during the last days in the southwestern portion. Heavy thunderstorms in the north central portion of the state on the 2nd resulted in considerable flooding in the area. Hardin County was the hardest hit with reports of as much as 6 to 7 inches at some locations. Generally, the northern and central portions of the state received between 4 to 9 inches of precipitation and the southern portion received between 1 to 4 inches. These heavy rains helped to relieve the stress on the overall water supply situation which had developed throughout most of the state.

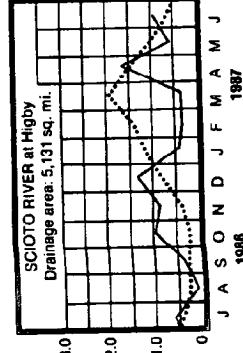
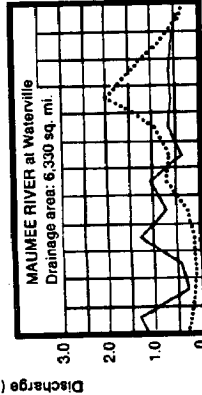
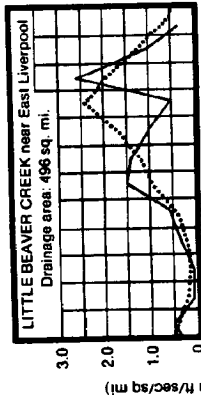
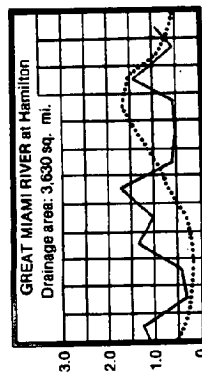
Cumulative precipitation for the first six months of the 1987 calendar year continues to be noticeably below normal. The average for the state as a whole is 15.50 inches, 4.10 inches below normal. Regional averages range from 17.21 inches, 0.40 inch below normal, for the North Central region to 13.35 inches, 4.22 inches below normal, for the Northwest region. Other regions showing sizeable deficiencies are: South Central, 6.73 inches below normal; Southwest, 6.55 inches below normal and West Central, 5.69 inches below normal.

Cumulative precipitation for the 1987 water year remains below normal for most areas of the state; exceptions are in the North Central, Northeast, and Central Hills regions where precipitation is above normal for the first time since January. The average for the state as a whole is 26.07 inches, 1.10 inches below normal. Regional averages range from 27.77 inches, 1.05 inches above normal, for the Central Hills region to 21.04 inches, 3.56 inches below normal, for the Northwest region. Departures from normal range from 2.55 inches above normal for the North Central region to 4.17 inches below normal for the Southwest region.

PRECIPITATION
JUNE 1987



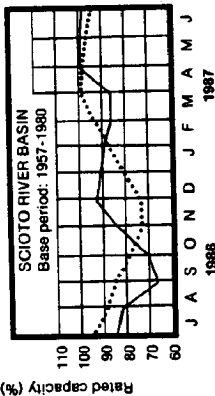
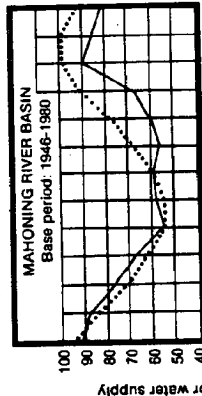
MEAN STREAM DISCHARGE



Base period for all stream: 1951-1980

Normal current

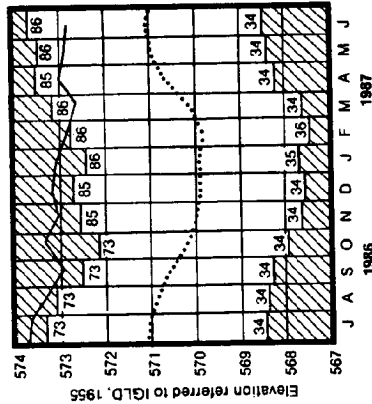
RESERVOIR STORAGE FOR WATER SUPPLY



RESERVOIR STORAGE for water supply for June declined in both the Mahoning River and the Scioto River basins. Storage in the Mahoning River basin continued to be below normal, primarily because Lake Milton is drained for repairs. Storage in the Scioto River basin continues to be slightly above normal. Reservoir storage in general has maintained a good status despite the lack of precipitation during the first few months of this year. Reservoir storage at the month's end for the Mahoning basin index reservoirs was 81 percent of rated capacity for water supply compared to 86 percent for last month and 92 percent for June 1986. Storage at the month's end for the Scioto basin index reservoirs was 96 percent of rated capacity for water supply compared to 99 percent for last month and 84 percent for June 1986.

STREAMFLOW for June was above normal for most of the state; exceptions were in the eastern portion where flows were deficient. A heavy storm on the 2nd, centering on Hardin County, produced severe flooding which caused the loss of one bridge and the temporary closing of many roads. Mean discharge and percent of normal at the index gaging stations were: Great Miami River, 3.341 cfs, 153 percent; Little Beaver Creek, 138 cfs, 53 percent; Maumee River, 3,059 cfs, 139 percent; Scioto River, 4,623 cfs, 153 percent. Streams throughout the state have maintained reasonably good flows despite the fact that runoff has been below normal for every month in this calendar year.

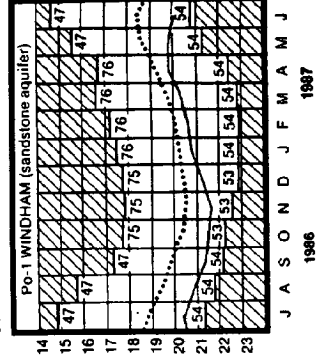
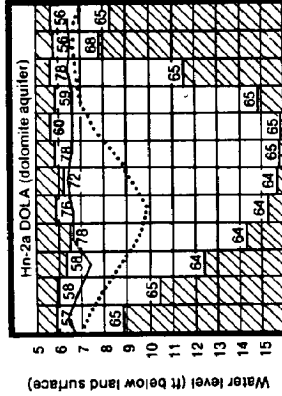
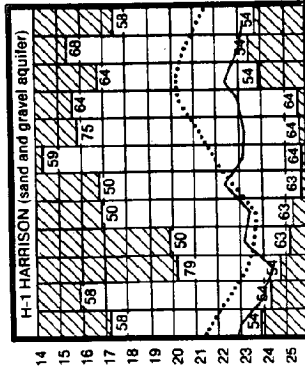
LAKE ERIE LEVELS at Cleveland



LAKE ERIE level for June declined slightly and was nearly one foot below the all time record high set in June 1986. Usually the lake level continues to rise slightly during June. The mean level was 572.78 feet (IGLD 1955), 0.09 foot below last month's mean level, 0.92 foot below the level observed for June 1986, 1.73 feet above normal, and 4.18 feet above Low Water Datum.

GROUND-WATER LEVELS for June showed moderate declines in most areas of the state. Net declines from last month's levels were not nearly as great as usually observed. This indicates that considerable recharge from the above normal precipitation has reached the saturated zone of the aquifers. Generally, water levels were below those levels observed last month in most areas of the state; exceptions were in some consolidated aquifers in the western portion of the state where water levels were slightly higher. Ground-water levels are above those levels observed for June 1986 in consolidated aquifers and below in unconsolidated aquifers. Generally, ground-water levels are noticeably below normal for most areas of the state; exceptions are in consolidated aquifers in the northwestern portion of the state where water levels are slightly above normal. The rains during the last week of May and the first two weeks of June have been most beneficial to water supplies in most areas of the state. At least the water supply situation has not worsened during the first month of the ground-water depletion period. A wet summer would certainly help to alleviate a serious water supply situation for most areas of the state.

GROUND-WATER LEVELS



Base periods: H-1, 1951-1979; Hn-2a, 1955-1979; Po-1, 1947-1979

ADDENDUM TO PAGE 19, PART 2,0
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
PERMIT D-0360

SEASONAL VARIATIONS OF WATER QUALITY AND QUANTITY

Surface and groundwater data contained in the Attachment 14 forms included with this permit revision, will indicate the seasonal variances of quality and quantity of the water in this area.

The water wells existing in the area give a fairly representative indication of water bearing zones that can be found in this region. The Probable Hydrologic Consequences of mining gives a detailed description of these characteristics.

Precipitation is, obviously, one of the principal factors influencing water systems. Infiltration of precipitation increases soil moisture and influences groundwater chemical composition. The time required for infiltrating precipitation to reach lower water bearing zones increases with increasing depth. Depending on the morphological structure, character of surface vegetation, and intensity of precipitation the amounts of infiltration also vary greatly. Amounts of infiltration subsequently influences the dissolved solids contents of groundwater which, in most cases, become more dilute during periods of prolonged precipitation. Rainfall data collected at or near the Powhatan No. 6 Mine has been charted on the following page. Annual rainfall for the years 1984 through 1987 are graphed in secession. Superimposed on 1987 data are average monthly rainfall which is derived by averaging each month separately and the mean monthly rainfall which is an average of all twelve months' data. The resultant shaded areas indicates which months would be considered those most likely to receive higher or lower than the mean monthly precipitation amount.

Included with the water data collected by OVCC is water quality and quantity documented by the Ohio EPA and the USGS.

All the data will show that an increased water quantity and a decrease in chemical constituent levels is realized during times of increased precipitation and snow melt of winter and spring seasons; while a decrease in water quantity and increase in chemical constituent levels is realized in dry summer and early autumn seasons.

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MEAN RAINFALL

ANG. MONTHLY RAINFALL

PRECIPITATION RECORD FOR USE WITH TOUR

Taylor 11" CLEAR-VU RAIN GAGE

LOCATION TraDet, Inc.
 COUNTY Ohio STATE West Virginia
 TIME OF OBSERVATION _____ YEAR 1989

ADDENDUM TO PAGE 19, PART 2, D(3)

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Remarks
1	0.00	0.00	0.00	Trace	0.58	0.00	0.00	0.00	0.15	0.27	0.00	0.00	s - melted snow
2	0.0	0.30	0.00	0.22	0.05	0.00	0.00	0.00	0.00	0.00	0.10	0.00	
3	0.18	0.24	0.00	0.04	0.00	0.80	0.00	0.00	0.00	0.00	0.00	0.02	
4	0.01	0.00	0.08	1.26	0.04	0.00	0.98	0.03	0.00	0.00	0.00	0.00	
5	0.19	0.00	1.16	0.00	0.50	0.36	0.00	0.06	0.00	0.00	1.00	0.00	
6	0.12	0.00	1.27	0.05	0.16	1.00	0.00	0.51	0.01	0.06	0.00	0.14	
7	0.18	0.00	0.00	0.00	0.14	1.00	0.00	0.00	0.00	0.00	Trace	0.00	
8	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.10	0.39	0.06	
9	0.00	0.00	0.00	1.00	0.66	0.42	0.01	0.00	0.00	0.00	0.10	0.00	
10	0.00	0.00	0.00	0.00	0.46	1.00	0.00	0.00	Trace	0.29	0.00	0.12	
11	0.12	0.00	0.00	0.00	0.14	0.00	0.25	1.00	0.00	0.00	0.00	0.00	
12	0.21	0.00	0.00	0.03	0.30	0.48	0.12	0.00	0.00	0.00	0.00	0.00	
13	1.00	0.35	0.00	Trace	0.12	0.35	0.00	0.00	0.00	0.00	0.00	Trace	
14	0.33	0.37	0.21	1.00	0.00	0.72	0.00	0.00	1.43	0.00	0.19	0.02	
15	0.10	0.92	0.00	0.00	0.00	0.79	1.00	0.00	0.69	0.00	0.56	0.15	
16	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.22	0.02	0.26	0.00	
17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.28	0.00	0.00	
18	0.00	0.00	0.26	0.38	0.00	0.00	0.00	0.15	0.00	0.42	0.06	0.00	
19	0.00	0.00	0.16	0.00	0.00	0.35	0.00	0.08	0.00	0.14	0.00	0.00	
20	0.00	0.90	1.06	0.00	0.04	1.48	1.22	0.00	0.00	0.02	0.00	0.01	
21	0.00	0.18	0.01	0.00	0.23	0.60	0.00	0.00	0.00	0.11	0.00	0.07	
22	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.03	1.31	0.00	0.00	Trace	
23	0.00	0.00	0.06	0.00	0.65	0.00	0.00	0.26	0.30	0.00	0.00	0.01	
24	0.0	0.00	0.06	0.00	1.00	0.00	0.00	0.00	0.00	0.00	Trace	0.01	
25	0.02	0.05	0.00	0.24	0.21	0.10	0.00	0.00	0.00	0.00	0.02	0.03	
26	0.33	0.12	0.00	0.00	0.67	0.85	0.22	0.00	0.00	0.00	0.07	0.03	
27	0.00	0.00	0.04	0.00	1.00	0.00	0.51	0.00	0.00	0.00	0.00	0.00	
28	0.01	0.00	0.68	0.47	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	
29	0.07	-	0.57	0.16	0.03	0.00	1.00	0.56	0.00	0.00	Trace	0.25	
30	0.00	-	0.41	0.00	0.00	0.00	0.03	0.00	0.10	0.00	0.00	0.27	
31	0.00	-	0.34	-	0.00	-	0.00	0.00	-	0.32	-	0.56	
Total	1.76	3.46	6.37	2.02	5.03	7.42	2.14	1.68	4.13	2.03	1.75	1.83	

SYBRON Taylor

Total Annual 39.64

PRECIPITATION RECORD FOR USE WITH YOUR
Taylor 11" CLEAR-VU RAIN GAGE

LOCATION

TraDet, Inc.

COUNTY

Ohio

STATE

West Virginia

TIME OF OBSERVATION

8:30 AM

YEAR 1990

ADDENDUM TO PAGE 19, PART 2, D(3)

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Remarks
1	0.01	0.16	0.00	0.69	0.00	0.00	0.00	0.06	0.40				s - melted snow
2	Trace	0.10	0.00	0.10	0.00	0.13	0.00	0.00	0.00				
3	0.10	0.70	0.00	0.07	0.12	0.13	0.00	0.00	0.00				
4	0.16	0.35	0.00	0.05	0.43	0.00	0.00	0.06	0.00				
5	0.00	0.00	0.00	0.12	0.30	0.00	0.19	0.05	0.20				
6	0.00	Trace	0.00	0.25	0.00	0.43	0.00	0.00	0.83				
7	0.00	0.10	0.00	0.06	0.00	0.00	0.00	0.00	1.25				
8	0.00	0.00	0.07	0.00	0.00	0.00	0.15	0.00	0.20				
9	Trace	0.60	0.08	Trace	0.04	0.38	0.47	0.70	0.91				
10	0.00	0.00	0.00	0.90	0.22	0.00	0.27	0.00	0.00				
11	0.04	0.15	0.07	0.16	0.00	0.00	2.33	0.00	0.00				
12	Trace	0.00	0.00	0.00	0.25	0.00	0.22	0.00	0.00				
13	0.00	0.04	0.00	0.17	0.21	0.00	0.77	0.20	0.00				
14	0.00	0.54	0.00	0.30	0.00	0.95	0.17	0.00	0.71				
15	0.07	0.41	0.00	0.00	0.05	0.00	0.13	0.00	0.00				
16	0.00	0.06	0.80	0.00	1.12	0.00	0.00	0.00	0.21				
17	0.12	0.00	0.00	0.09	0.00	0.55	0.00	0.00	0.00				
18	0.00	0.00	Trace	0.00	0.00	0.00	0.00	Trace	0.02				
19	0.08	0.00	0.25	Trace	0.15	0.00	0.00	1.45	0.40				
20	0.93	0.00	0.00	0.30	0.15	0.00	0.48	0.00	0.00				
21	0.03	0.00	0.00	0.04	0.00	0.02	0.27	0.00					
22	0.00	0.12	0.00	0.00	0.00	0.18	0.74	0.20					
23	0.18	0.14	0.20	0.00	0.00	0.06	0.02	0.40					
24	0.01	0.06	0.00	0.00	0.00	0.09	0.00	0.00					
25	0.09	0.00	0.00	0.16	1.12	0.00	0.00	0.00					
26	0.07	0.00	0.00	0.00	0.21	0.00	0.20	0.00					
27	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00					
28	0.40	0.00	0.00	0.00	1.08	0.16	0.00	0.00					
29	0.74	-	0.02	0.00	0.39	0.00	0.00	0.18					
30	0.00	-	0.08	0.00	0.00	0.00	0.08	0.00					
31	0.00	-	0.21	-	0.00	-	0.00	0.00	-				
Total	2.87	3.63	1.78	3.46	5.84	3.94	6.29	3.18					

SYBRON Taylor

Total Annual

PRECIPITATION RECORD FOR USE WITH YOUR

Taylor 11" CLEAR-VU RAIN GAGE

LOCATION

TraDet Laboratories, Inc.

COUNTY

Ohio

STATE

West Virginia

TIME OF OBSERVATION

YEAR 1988

ADDENDUM TO PAGE 19, PART 2, D(3)

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Remarks
1	0.00	1.87	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.01	Trace	s - melted snow
2	0.00	0.77	0.07	0.03	0.00	0.14	0.00	0.00	0.00	0.02	0.01	0.00	
3	0.10	0.00	0.33	0.77	0.00	0.14	0.00	0.00	0.50	0.00	0.23	0.00	
4	0.00	0.01	0.39	0.00	0.04	0.00	0.00	0.00	0.15	0.02	0.01	0.03	
5	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.05	0.00	0.57	0.00	
6	0.01	0.00	0.00	0.17	0.00	0.00	0.00	0.33	0.00	0.00	0.20	0.00	
7	0.04	0.01	0.00	0.14	0.00	0.00	0.00	0.14	0.00	0.02	0.00	Trace	
8	0.03	0.00	Trace	0.00	0.01	0.99	0.00	0.00	0.00	0.00	0.00	0.00	
9	0.00	0.00	0.05	0.00	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
10	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.08	0.01	
11	0.00	0.03	0.00	0.00	0.15	0.00	Trace	0.02	0.00	0.32	0.00	Trace	
12	0.01	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.67	0.00	0.00	0.04	
13	0.01	0.00	Trace	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.05	
14	0.00	0.00	Trace	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
15	0.00	0.01	Trace	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
16	0.00	Trace	Trace	0.00	0.00	0.03	0.00	0.00	0.00	Trace	0.00	Trace	
17	0.23	0.00	0.01	Trace	0.00	0.00	0.00	0.00	0.12	0.37	0.00	0.01	
18	0.03	0.00	0.05	0.27	0.66	0.00	1.01	0.95	0.00	0.03	0.02	Trace	
19	1.01	0.00	0.04	0.00	0.00	0.00	0.13	0.05	0.01	0.01	0.45	0.00	
20	0.00	Trace	0.09	0.00	0.00	0.00	0.00	0.00	0.03	Trace	0.78	0.00	
21	Trace	Trace	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Trace	0.11	
22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00	
23	0.01	0.08	0.00	0.10	0.00	0.00	0.32	0.76	0.00	0.28	0.00	0.00	
24	0.00	0.10	0.00	1.00	0.00	0.00	0.00	0.00	0.05	0.15	0.00	0.00	
25	0.00	0.02	0.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
26	0.01	0.01	0.26	0.01	0.00	0.00	0.00	0.00	0.00	0.00	Trace	0.30	
27	0.00	Trace	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.14	0.03	
28	0.01	0.00	0.00	0.32	0.00	0.00	0.00	0.22	0.00	0.06	0.01	0.47	
29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.00	0.00	0.00	0.00	
30	0.00	-	Trace	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	
31	0.12	-	0.03	-	0.00	-	0.00	0.00	-	0.00	-	0.00	
Total	1.62	2.91	2.29	1.86	2.00	1.35	2.90	5.95	1.31	1.42	2.62	2.37	

SYBRON Taylor

Total Annual

TOVCC 15292

**PRECIPITATION RECORD FOR USE WITH YOUR
Taylor 31" CLEAR-VU RAIN GAGE**

LOCATION TraDet Laboratories, Inc. **COUNTY** Ohio **STATE** West Virginia
TIME OF OBSERVATION 8:30 AM **YEAR** 1987

ADDENDUM TO PAGE 19, PART 2, D(3)

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Remarks
1	0.00	0.06	0.42	0.02	0.00	0.22	0.34	0.00	0.00	0.00	0.00	0.10	s - melted sn
2	0.31	0.00	0.02	0.20	0.00	0.01	0.20	0.69	0.00	0.25	0.00	0.02	
3	0.09	0.00	0.00	0.53	0.65	0.06	0.00	0.00	0.00	0.10	0.00	0.28	
4	Trace	0.00	0.00	0.80	0.02	0.00	0.00	0.06	0.00	0.00	0.02	0.00	
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.54	0.34	0.00	0.00	0.00	
6	0.00	0.00	0.10	0.01	0.00	Trace	0.40	0.00	0.02	0.28	0.00	0.00	
7	Trace	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.85	0.06	0.00	0.00	
8	0.00	0.09	0.00	0.00	0.00	0.70	0.00	0.00	0.10	Trace	0.12	0.00	
9	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.46	0.00	0.00	0.18	0.14	
10	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.14	0.00	
11	0.01	0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.04	0.02	0.00	0.14	
12	0.00	0.22	0.00	0.30	0.00	0.81	0.00	0.00	0.03	0.00	0.00	0.00	
13	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.00	0.00	0.00	0.00	0.00	
14	0.00	0.00	0.04	0.10	0.06	0.00	0.03	0.00	0.00	0.00	0.00	0.18	
15	0.02	0.00	0.00	0.12	0.00	0.05	0.23	0.00	0.00	0.00	0.00	0.02	
16	0.02	0.00	0.00	0.24	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.03	
17	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.20	0.10	0.21	0.02	
18	0.07	0.00	0.00	0.00	1.25	0.00	0.00	0.00	0.12	0.00	0.00	0.00	
19	0.56	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.17	Trace	0.00	0.47	
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.07	0.00	0.00	
21	0.00	0.00	0.00	0.00	0.00	1.15	0.00	0.06	0.00	0.00	0.00	0.00	
22	0.30	0.14	0.00	0.00	0.19	0.28	0.00	2.25	0.15	0.02	0.00	0.00	
23	0.02	0.00	0.00	1.23	0.00	0.00	0.00	0.00	0.00	0.00	Trace	0.00	
24	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	Trace	0.04	0.15	0.11	
25	0.00	0.00	0.56	0.00	0.29	0.12	0.00	0.01	0.00	0.00	0.03	0.41	
26	0.01	0.00	0.00	0.00	0.73	0.00	0.00	0.26	0.00	0.00	0.00	0.02	
27	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.05	0.00	0.26	0.11	Trace	
28	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.69	0.00	0.00	0.90	0.38	
29	0.33	-	0.00	0.03	0.00	0.20	0.00	0.03	0.56	0.00	0.35	0.00	
30	0.13	-	1.08	0.00	0.00	0.00	0.00	0.00	0.05	0.00	Trace	0.00	
31	0.07	-	0.11	-	0.38	-	0.00	0.21	-	0.00	-	0.19	
Total	2.06	0.77	2.23	4.06	3.61	3.75	1.43	5.35	2.63	1.30	2.29	2.70	

SYBRON/Taylor

Total Annual 32.18

ADDENDUM TO PAGE 19, PART 2, E
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
PERMIT D-0360

PROBABLE HYDROGEOLOGIC CONSEQUENCES OF
LONGWALL MINING OPERATIONS
AT POWHATAN NO. 6 MINE

Topographic Setting

The Powhatan No. 6 Mine is located in Belmont County, Ohio which is within the Appalachian Plateau physiographic province. The topography of the county is typically hilly with broad rounded ridges and deep v-shaped valleys dissecting the terrain. Total topographic relief within the county is approximately 800'. However, within the Mine #6 longwall area, maximum relief is approximately 384'. The elevation varies between 1317' (maximum) above sea level in the central portion of the study area and 971' (minimum) in the south-central portion. Figure #1 is a portion of the Hunter and Armstrong Mills, Ohio U.S.G.S. 7½ Minute Topographic maps showing the location of the area of interest.

Drainage within the entire study area occurs to the south through several small streams that are tributaries to Bend Fork. Bend Fork flows to the southeast along the southern boundary of the study area and drains in to the Captina Creek which is the main drainage system for the southern portion of Belmont County. Captina Creek flows eastward to the Ohio River with the confluence of the two located at Powhatan Point, Ohio.

Geologic Setting

The bedrock units that underlie the study area consist of Permian through Pennsylvanian in Age. The Permian Age rocks consist of Dunkard Group. This sequence covers much of the study area at the surface. Below the Dunkard Group lies the Monongahela and Conemaugh Formations of the Pennsylvania system. The Monongahela Formation is exposed only in the stream valleys with the underlying Conemaugh Formation not exposed at all. Figure #2 is a generalized stratigraphic column showing the relationship of these bedrock units.

The Monongahela Formation consists of the Pittsburgh #8 coal seam at the base through the Waynesburg #11 coal seam. Other coal seams consist of the Redstone #8A, Fishpot, Sewickley #9 and Uniontown #10 coal seams. Other important members of the formation are the Redstone Limestone, the Fishpot Limestone and the Benwood Limestone, all of which are found above the Pittsburgh #8 coal seam. The remaining portion of the Monongahela Formation consists of clay, sandstone and shale.

ADDENDUM TO PAGE 19, PART 2, E
PAGE TWO

Above the Waynesburg #11 coal seam, the Dunkard Group consists of coal (Washington #12 seam), limestone, sandstone, shale and clay. The Dunkard Group is found at the cap of the hilltops at elevations above sea level of approximately 950' and above.

Below the Pittsburgh #8 coal seam lies the Conemaugh Formation. The Conemaugh consists of sandstone, siltstone, mudstone, shale, clay and limestone. Much of the formation consists of undifferentiated strata, however, several important members lie relatively close to the Pittsburgh #8 coal seam. These members are the underclay to the Pittsburgh #8 coal seam, the Upper Pittsburgh Limestone, the Bellaire Sandstone and the Lower Pittsburgh Limestone. These units are not tapped as aquifers within the study area. According to the Ohio Division of Water, water found below the No. 8 Seam tends to be brackish (see enclosed letter from Division of Water).

Figures #3 and #4 are cross sections running east-west and north-south, respectively, showing the subsurface relationship of the bedrock units. Structurally, the rock units dip to the southeast at an average of 20 feet per mile. This gentle dip can increase to as much as 70 feet per mile where small flexures increase the dip locally.

Hydrology

Bedrock units within the study area are generally tight and have limited ground water development potential. Domestic well yields are generally less than 5 gallons per minute (gpm) with transmissivities usually less than 1,000 gallons per day per foot. Ground water within the study area occurs under water table, semi-confined and confined conditions. Storage coefficients should range from 10^{-2} to 10^{-6} .

Most valuable ground water supplies developed in rock units are dependent on natural fracturing or secondary porosity and permeability. Primary porosity and permeability is relatively low in the bedrock as is noted by the relatively low yield of domestic wells and the reliance on springs for domestic water supplies. Approximately 50% of the domestic water supplies within the study area rely on springs as the source. Most of these springs are contact springs located along the valley walls where bedrock units of lower permeability and porosity impede downward infiltration of ground water and force water to discharge as springs.

The aquifers within the study area that are tapped for domestic water supplies are regional in extent. The relatively flat-lying orientation of the bedrock and the high topographic relief (i.e., deep v-shaped valleys) of the area, tends to isolate many of the aquifers to small upland areas. Therefore, the aerial extent of the unit is limited and so would be the recharge potential.

ADDENDUM TO PAGE 19, PART 2, E
PAGE THREE

Downward migration of ground water is also controlled by naturally occurring fractures. These earth fractures, while not ubiquitous, do occur sporadically, over most of the mine plan area and have an effective depth of less than 200'. Below 200', the fractures may still be present, but are either filled with silts and clays, or have healed due to lithostatic pressures. Therefore, the enhanced permeability of these fractures is regulated and the relatively low primary permeability of the units controls ground water flow at depth. This premise is based on the general limited hydraulic communication with the No. 6 Mine.

It is a generally accepted principal of hydrogeology that joints, cleavage, and other fractures tend to be tighter and have lower permeability with increasing depth. This premise is substantiated at the local level by the water conditions exhibited in the No. 6 Mine. At the time of our initial hydrologic evaluation, mine engineers and mine foremen were interviewed concerning water occurrence in the mine. It was discovered through those interviewed that the No. 6 Mine made very little water and that water flow through fractures into the mine was rare. Most areas of the mine were essentially dry with no or very little water accumulation. This general condition was reported to be true with as little as 200 feet of cover. These site specific observations coupled with the general premise of closed fractures with depth lead to the statements made in the PHC. There were no specific references utilized that are site specific that further substantiate the comments.

In a study conducted by our office in 1980, the water make of the mine (total water inflow), was calculated to be approximately 42 gallons per day (gpd) per acre mined or 26,880 gpd per square mile. Most sections of the mine were essentially dry and water inflow was generally limited to areas of low cover and stream valleys or fractured zones. Interviews with mine personnel today, indicate the water conditions in the mine have not changed substantially in the last ten years.

In contrast to the mine water make, the ground water recharge potential of the area has been estimated between 100,000 and 250,000 gpd per square mile or 155 to 400 gpd per acre. It thus appears only 10 to 27 percent of the ground water recharge potential is intercepted by the mine. This clearly indicates the majority of the subsurface flow system within the mine plan area is shallow and is unaffected by deep mining.

A number of years ago, when the Powhatan No. 6 Mine was owned and operated by The NACCO Mining Company, photolineaments were traced over the mine area. The report from the project no longer exists, but talking to Mr. William Siplivy, who was associated with the project was beneficial. Mr. Siplivy indicated that the photolineaments were not associated with poor conditions in the mine, except that the lineaments defined stream channels.

Effects of Subsidence on Ground Water

As discussed in other sections of this application, subsidence will occur as a result of the proposed longwall mining activities. A rubble zone approximately 30 to 50 feet thick above the coal seam is expected. Above the rubble zone, large to very large blocks of bedrock will be present. Interception of ground water moving along naturally occurring fractures is expected and some communication with the mine will no doubt occur.

However, overall effects are predicted to be relatively minor with local drainage of aquifers occurring where subsidence induced fractures intercept naturally occurring fractures that contain ground water. In these local areas, water tables may be lowered and interruption of service from domestic wells and springs is possible. The effects are not expected to be widespread and even where they occur, the effects are anticipated to be temporary.

In this situation, "temporary" has two different time frames:

Short Term

Water levels recovery is a documented phenomenon in similar dewatering situations. The recovery of the water level is most commonly explained by the healing of fractures that are transmitting water downward to lower piezometer head potential of the mine void (i.e., unflooded mine). Fractures are healed in response to several factors.

- A. - Closure of fractures in response to lithology pressures of the rock sequence.
- B. - Filling of the fractures with sediments, primarily silt and clay, carried by downward flowing water.
- C. - Swelling of clay and claystones as they encountered downward flowing water.

Water level recovery by this mechanism normally occurs within months after mining.

Long Term

In the long-term, lowering of the water level is rectified by the elimination of a low head potential in the mine, (i.e., the mine floods). As head potential increases, (i.e., pool level increases) in the mine void, the ground water flow and level is re-established in the rock sequence above the mine. The level of ground water past mining may not reflect the original pre-mining level, but should reach levels that domestic water wells and springs could be put back into service.

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PAGE FIVE

Water level recovery by this mechanism normally occurs within several years after mining.

Several sources of ground water have been undermined by the longwall mining operation to date. The results of the monitoring are shown on the accompanying tables. Each source will be discussed below.

1. W-21 Kolenc Well. The Kolenc well is located outside of the angle of draw of the first longwall panel (5 West). Mining progressed past the well in early March, 1990. The pre-mining static water level below the ground surface was about 22 ft. After mining, the level decreased initially to as much as 55 ft. The static water level is now recovering, with an average depth of about 29 ft. below the ground surface.
2. W-36 Liddle Dug Well. The Liddle Dug Well is located over the 5 West longwall panel, and was undermined in late March, 1990. The pre-mining static water level below the ground surface was about 16 ft. After mining, a crack appeared in the bottom of the well, and the well was dewatered. It currently holds small amounts of water after large rainfalls, but is generally considered to be dry.
3. W-35 Liddle Drilled Well. The Liddle Drilled Well is located over the 5 West longwall panel near W-36. It was also undermined in late March, 1990. The pre-mining static water level below the ground surface was about 15 ft. After mining, the hole collapsed at about 72 ft. below the surface. Initially, water could be heard and seen cascading in the hole, but the static water level could not be taken due to the collapsed hole. In April, 1990, the well began holding water above the 72 ft. level. Currently, the well is recovering, with the average water level at about 55 ft. and rising.
4. W-37 Glover Well. The Glover Well is located outside the angle of draw of the 5 West panel near W-35 and W-36. It is a shallow (42 ft deep) dug well located high on a hill. During the 1988 drought, the well reportedly went dry, but now holds water at a level of 30 to 40 ft. below the ground surface. These levels were unaffected by the longwall mining.
5. W-13 Liddle Rt. 9 Well. The Liddle Rt. 9 Well is located outside the angle of draw at the end of the 5 West panel. It was unaffected by the longwall mining.
6. W-19 Bobick Well. The Bobick well is a shallow dug well located over the 5 West gate section (between the first and second longwall panels). The well is covered with a hand pump making pre-mining water level readings

impossible. The property was purchased by the Ohio Valley Coal Company and the well was opened in order to provide access for measurements in April, 1990. The 5 West panel mined past the well in April, 1990, with little or no effect upon the static water level. The 6 West panel mined past the well in July, 1990, again with little or no effect upon the well.

7. W-32 Riley Well. The Riley well is located over the 6 West panel. Mining progressed under the well in August, 1990 with little or no effect.
8. W-38 Riley House Well. The Riley House Well is located near W-32 and was also undermined in August 1990. There was little or no effect on the well.
9. Sp-11 Liddle Spring. The Liddle Spring is located over the 5 West panel and was undermined in mid-April, 1990. Pre-mining flows were both estimated and measured, and averaged about 2 gpm. After mining, the flows began to fluctuate, but averaged about .76 gpm.
10. Sp-20 L. Ogilbee Spring. The L. Ogilbee Spring is located over the 6 West panel and was undermined in late June, 1990. Because the cistern was buried and the water was partially pumped to the house as well as gravity fed to a watering trough, accurate pre-mining levels were not possible. An estimated 4 gpm (2 springs were developed to flow to the same cistern) was used in the pre-mining data. After mining, the flow fluctuated before going dry in July, 1990.
11. Sp-22 Bobick Spring. The Bobick Spring, located above the 6 West panel was developed in June, 1989 and was not equipped with a pipe to determine flows until May, 1990. The pre-mining flow was about 1 gpm. After mining, the flow decreased to about 0.1 gpm.

In summary, the longwall mining has impacted several of the wells and springs within close proximity of the panels. However, not all of the developed sources have been impacted, even when located directly over the mining. The impacts are generally limited to the angle of draw or just slightly beyond, and the early signs of recovery is evident in some cases.

There were several wells that were buried or covered and measurement of the static water level was not possible. They include: W-41, W-42, W-31, W-39, and W-29.

Ground Water Quality

The attached water quality data is presented for several wells and springs in the study area. Water quality is generally good for well and springs that tap the aquifers above the mine.

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PAGE SEVEN

The attached tables (pages 1 through 4) show the comparison of water quality before mining with the quality after mining. In the case of W-21, the source is located outside the angle of draw. The static water level declined soon after mining passed the well in March, 1990. There were no changes in water quality after the mining had passed.

Mining occurred under W-35 in late March, 1990. The water level declined initially and is recovering. The total iron content increased from less than 0.02 mg/l to approximately 2 mg/l. Manganese showed slight increases. Other parameters remained the same as pre-mining samples.

1. W-37 is located outside the angle of draw of the first longwall panel. The static water level was not affected by the mining. The total iron content increased initially, but is currently decreasing. Total manganese showed a slight increase and total suspended solids increased markedly but is now decreasing.
2. W-19 is located over the 6 West gate, and both panels 1 and 2 passed by the well with little or no effect on the water quality.
3. W-32 is located over panel 2 and was undermined in August, 1990. Prior to mining, the total iron content increased but is currently declining. The static water level in the well was not affected by the mining. Monitoring of the water quality will continue to determine if there are any longer term effects.
4. W-38 is located near W-32 over panel 2 and was also undermined in August, 1990. After mining, the total acidity content increased. The total iron content increased prior to mining. Monitoring of the water quality will continue to determine if there are any longer term effects.
5. Sp-11 was undermined by panel 1 in April, 1990. Initially, the total suspended solids increased, but were within the range of pre-mining samples. There was little or no effect on the water quality.
6. Sp-20 was undermined by panel 2 in late June, 1990. Flow stopped in July, 1990. One sample was taken in September, 1990 from the livestock watering tank. It showed a slight increase in suspended solids. If flow from the spring resumes, water samples will be analyzed to determine if there are any long term effects.

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In summary, with the exception of some short term variations, the water quality was unchanged by the longwall mining. The minor fluctuations in several parameters were predicted before mining and should return to their original levels. No long term effects on the quality of the water is anticipated at this time, but sampling will continue to confirm this statement.

ADDENDUM TO PAGE 19, PART 2, E
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
PERMIT D-0360



Fountain Square
Columbus, Ohio 43224

December 6, 1990

David L. Bartsch, P.E.
The Ohio Valley Coal Company
56854 Pleasant Ridge Road
Alledonia, Ohio 43902

Dear Mr. Bartsch:

I have reviewed the well-log data for the area of Belmont County, Smith Township, Sections 19, 20, 25, 26, 31, and 32. No logs on file indicate a potable aquifer below the No. 8 Coal Seam. The deepest well on record in this area is 93 feet below grade and is enclosed with the original analysis.

According to a salt/fresh water interface report by Donald A. Vogel, Division of Water, 1982, any water derived from an elevation 200 feet below the valley floor would contain over 10,000 ppm Total Dissolved Solids and rendered unpotable.

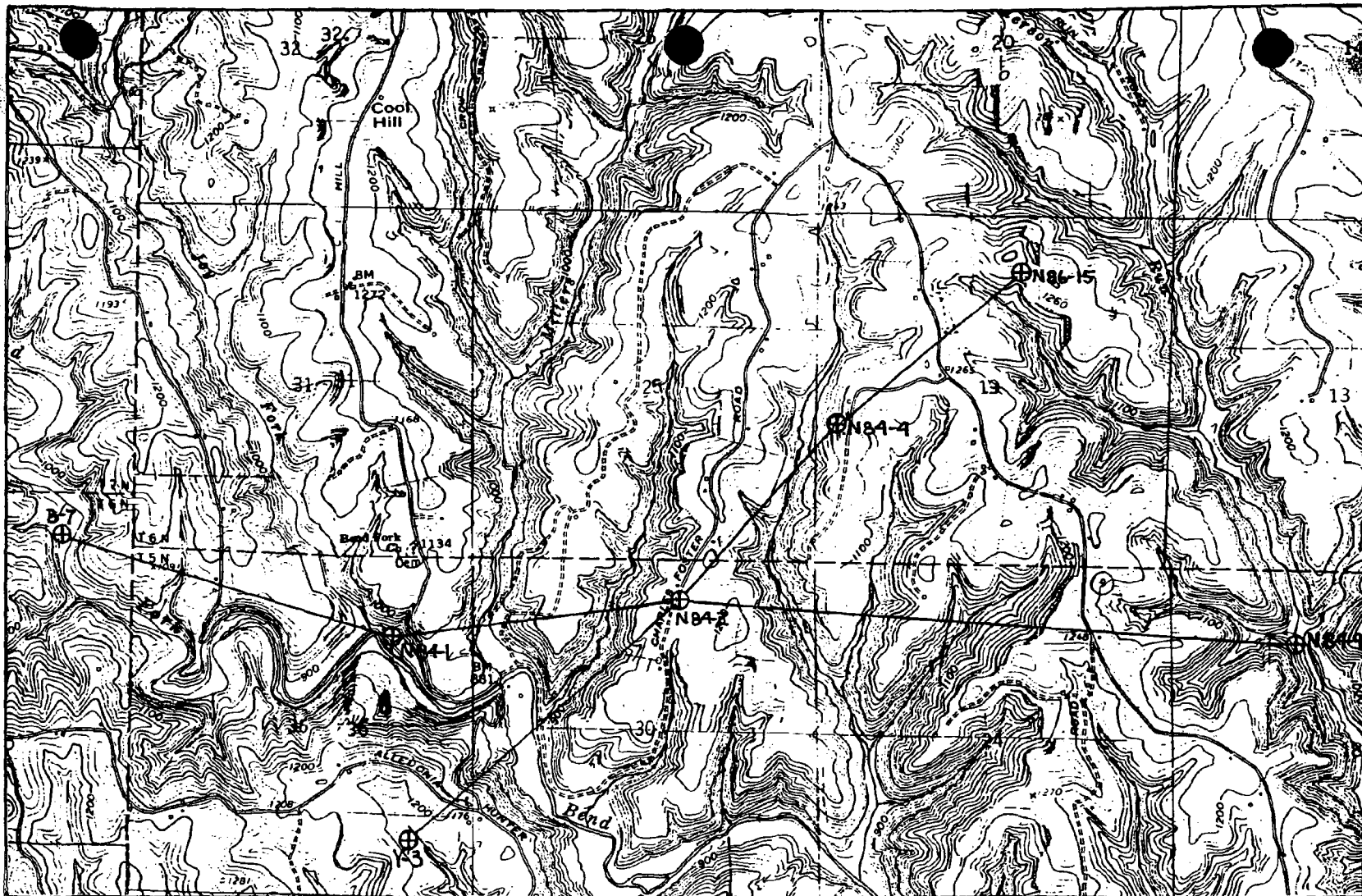
If you have any further questions regarding this matter, please contact me.

Sincerely,

Carrie L. Frederick
Hydrogeologist
Division of Water
Ground Water Resources Section

Richard F. Celeste, Governor

TOVCC 15302




 Line Of
 Cross Section

FIGURE #1
 NORTH AMERICAN COAL COMPANY
 POMHATAN #6 MINE
 SITE LOCATION MAP

From 7 1/2 Minute U.S.G.S.
 Topographic Quadrangles
 Hunter & Armstrong Mills, Ohio

Prepared by:
 MOODY AND ASSOCIATES, INC.

TROYCC 153303

GENERALIZED STRATIGRAPHIC COLUMN

FIGURE # 2

POWHATAN #6 MINE

DUNKARD
GROUP

MONONGAHELA
FORMATION

CONEMAUGH
FORMATION

From:
U. S. Dept. of Interior
Geological Survey
Professional Paper 380

Prepared by:
MOODY & ASSOCIATES, INC.

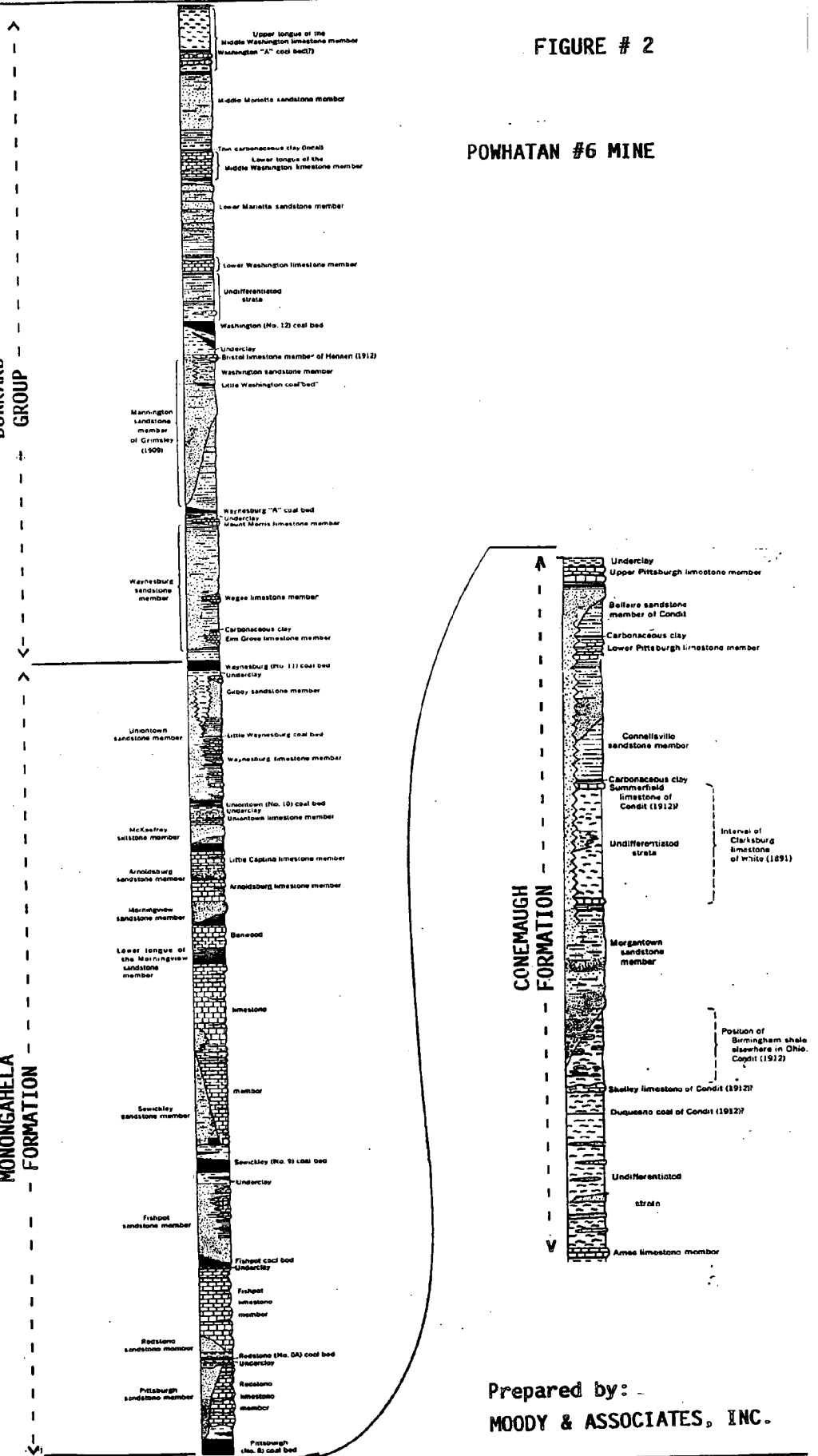
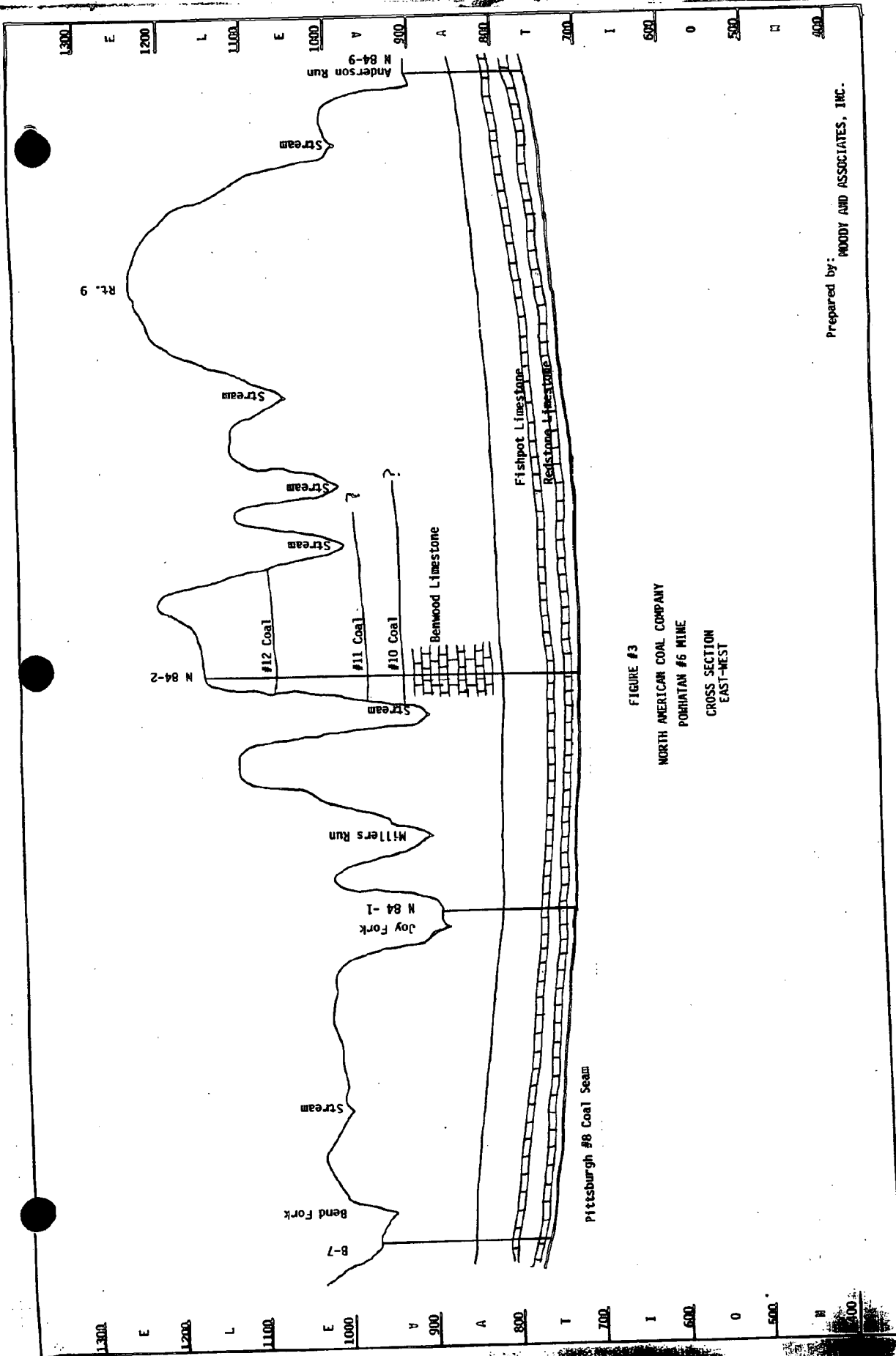
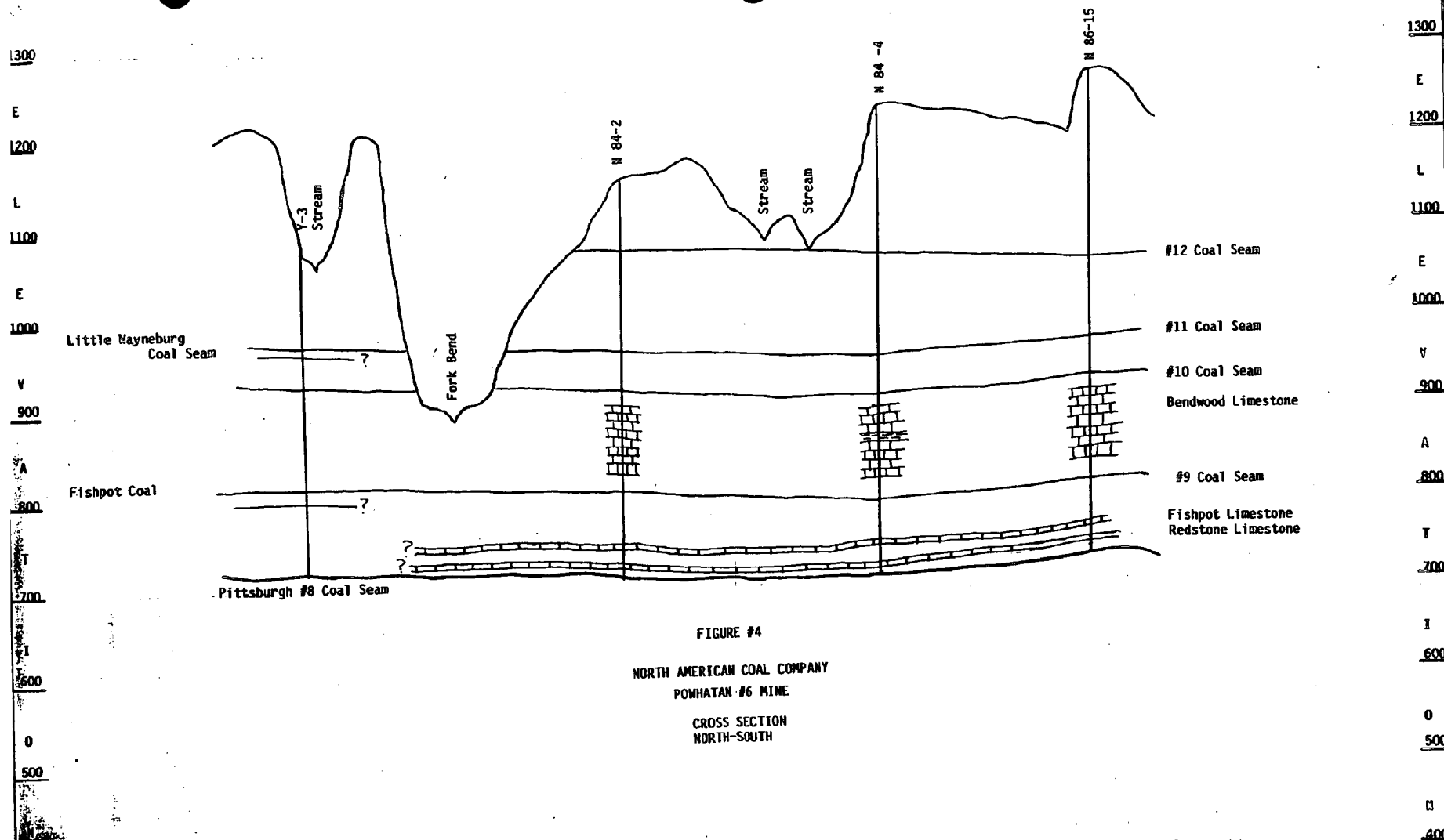


FIGURE #3



Prepared by: MOODY AND ASSOCIATES, INC.

FIGURE #3
NORTH AMERICAN COAL COMPANY
POHATAN #6 MINE
CROSS SECTION
EAST-WEST



TOVCC 15306

MONTHLY MONITORING DATA

		1989											
SOURCE		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
W-13	SWL (FT)		14									23	24
W-19	SWL (FT)		30										
W-21	SWL (FT)			22						21	24		26
W-22	SWL (FT)		42	42	46	44	50	51		60			57
W-25	SWL (FT)		48	47	47	46	46	46					
W-26	SWL (FT)			41	45	42	44	43					
W-27	SWL (FT)		32	32	31	31	30	30					36
W-30	SWL (FT)		26	26	27	27	30	29					36
W-32	SWL (FT)		30	28	30	27	35	32					69
W-33	SWL (FT)					16		16			16		
W-34	SWL (FT)										11		
W-35	SWL (FT)										17	16	17
W-37	SWL (FT)										37	38	37
W-38	SWL (FT)										38		46
SP-11	FLOW (GPM)		2.0	2.0	2.0	2.0	2.0	2.0		0.8	3.5	1.6	1.1
SP-20	FLOW (GPM)		4.0	4.0	4.0	4.0	4.0	4.0					
SP-21	FLOW (GPM)		2.0	2.0	2.0	2.0	2.0	2.0					
SP-22	FLOW (GPM)			2.0	2.0	2.0	2.0	2.0					
SP-23	FLOW (GPM)						2.0	2.0			1.5		
SP-24	FLOW (GPM)						2.0	2.0			1.5		

MONTHLY MONITORING DATA

		1990											
SOURCE		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
W-13	SWL (FT)	20	21	15	20	17		22	23	20.5	19		
W-19	SWL (FT)				22	21	20	21	25	25	26		
W-21	SWL (FT)	20	21	48	55	45	32	31.5	55	29.5	28		
W-25	SWL (FT)	46	46	49	47	46	45	45	48	49	50		
W-26	SWL (FT)	40	40	46	51	39	40	40	45	40.5	40		
W-27	SWL (FT)	30	30	32	32	32	31	31	33	31	33		
W-28	SWL (FT)				50	49	49	49	52	51	50		
W-30	SWL (FT)	28	24	30	35	30	27	28	33	30	30.5		
W-32	SWL (FT)	32	28	39	30	28	26	29	30.5	31	33		
W-33	SWL (FT)	20	21	15	23	18	21	17	21	21	19		
W-34	SWL (FT)				12	9	6	7	10	8	7		
W-35	SWL (FT)				58	55	58	58.3	61	54.5	50.6		
W-36	SWL (FT)				27	25	27			26.8	26.3		
W-37	SWL (FT)				39	33	36	36.7	38	35	36		
W-38	SWL (FT)	21	19	40	37	28	24	27	31	21	24		
W-43	SWL (FT)										5.0		
SP-11	FLOW (GPM)				0.5	1.4	1.5	0.4	0.1	0.4	0.8		
SP-20	FLOW (GPM)				0.0	0.3	0.0	0.0	0.0	0.0	0.0		
SP-21	FLOW (GPM)				0.2	0.5	0.5	0.6	0.3	0.3	1.1		
SP-22	FLOW (GPM)			2.0	0.0	1.3	0.8	0.8	0.1	0.0	0.1		
SP-23	FLOW (GPM)				0.8	1.3	1.3	1.5	1.2	1.3	0.9		
SP-24	FLOW (GPM)				1.5	2.3	1.9	2.4	1.3	1.3	0.8		
SP-29	FLOW (GPM)							2.1	0.6	1.3	1.7		
SP-30	FLOW (GPM)							1.5	0.8	1.0	2.6		
SP-31	FLOW (GPM)								0.8	1.6	1.3		

DETAILED MONITORING OF SOURCES THAT HAVE BEEN UNDERMINED

H-2100		H-36		H-35		H-3700		SP-11	
DATE	SWL(FT)	DATE	SWL(FT)	DATE	SWL(FT)	DATE	SWL(FT)	DATE	FLOW(GPM)
MAR89	22	1-3	17	OCT89	17	OCT89	37	FEB89	2+
SEPT89	21	2-22	12.5	NOV89	16	NOV89	38	MAR89	2+
OCT89	24	3-10	16	DEC89	17	DEC89	37	APR89	2+
DEC89	26	3-19	19.5	1-3	15	1-30	32	MAY89	2+
1-30	20	3-260	D	2-22	11	2-23	30.5	JUN89	2+
2-22	21	4-9	D	3-10	15	3-12	34	JUL89	2+
3-28	31	4-16	26.5	3-19	30	3-19	36	SEPT89	0.8
3-10	53	4-23	D	3-268	72	3-268	38	OCT89	3.5
3-12	45	5-2	D	4-9	72	APR90	39	NOV89	1.6
3-14	47	5-14	26.5	4-16	70	MAY90	33	DEC89	1.1
3-19	45	5-28	24.75	4-23	70	JUN90	36	1-3	3.00
3-26	48	6-11	26.6	5-2	71	JUL90	36.7	2-22	3.50
APR90	55	6-14	26.6	5-14	68	AUG90	38	3-14	1.30
MAY90	45	JUL90	D	5-28	55	SEPT90	35	4-5	1.82
JUN90	32	AUG90	D	6-11	58	OCT90	36	4-6	1.82
JUL90	31.5	SEPT90	26.8	6-14	57.6			4-7	1.72
AUG90	55	OCT90	26.3	JUL90	58.3			4-9	1.33
SEPT90	29.5			AUG90	61			4-10	0.75
OCT90	28			SEPT90	54.5			4-128	1.20
				OCT90	50.6			4-14	0.66
								4-15	1.00
								4-16	0.86
								4-23	0.51
								4-24	0.46
								5-28	1.36
								6-11	1.46
								JUL90	0.36
								AUG90	0.11
								SEPT90	0.36
								OCT90	0.80
SP-20		H-1988		H-32		H-38			
DATE	FLOW(GPM)	DATE	SWL(FT)	DATE	SWL(FT)	DATE	SWL(FT)		
FEB89	4+	APR90	22	JAN89	30	OCT89	38		
MAR89	4+	MAY90	21	FEB89	28	DEC89	46		
APR89	4+	JUN90	20	MAR89	30	JAN90	21		
MAY89	4+	7-258	21	APR89	27	FEB90	19		
JUN89	4+	8-8	22	MAY89	35	MAR90	48		
JUL89	4+	8-13	25	JUN89	32	APR90	37		
4-27	0.02	8-20	24	DEC89	69	MAY90	28		
5-21	0.33	9-10	25	JAN90	32	JUN90	24		
6-14	0.00	10-8	26	FEB90	28	7-25	27		
6-20	0.73			MAR90	39	8-8	30		
6-21	0.73			APR90	30	8-13	31		
6-268	0.00			MAY90	28	8-208	28		
6-27	0.00			JUN90	26	9-20	21		
6-28	0.00			7-25	29	10-8	24		
6-29	0.68			8-8	30				
7-5	0.00			8-13	30.5				
7-18	0.00			8-208	31				
8-15	0.00			9-20	31				
9-19	0.00			10-8	33				
10-16	0.00								

D=DRY

+ = FLOW ESTIMATED

8 = SOURCE UNDERMINED

88 = SOURCES LOCATED OUTSIDE OF LONGWALL PANELS

ADDENDUM TO PART 2, PAGE 19, E
THE OHIO VALLEY COAL COMPANY
POWATAN NO. 6 MINE
PERMIT D-0360

WATER QUALITY COMPARISON - UNDERMINED SOURCES

	W-21											
	2-27-90	3-29-89	4-20-89	5-24-89	6-30-89	7-6-89	10-5-89	2-28-90	3-12-90	6-11-90	9-20-90	
pH	7.14	7.3	6.97	7.1	7.03	7.14	7.25	7.27	7.18	7.5	7.01	
TOTAL ACIDITY	50	20	39.4	35.6	48.4	36.8	39.3	30.9	30.2	9.7	31.6	
TOTAL ALKALINITY	262	289	674	284	273	269	315	304	295	58	284	
TOTAL IRON	0.05	0.06	0.05	<.02	<.02	<.02	0.03	0.08	0.07	0.19	0.12	
TOTAL MANGANESE	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	0.02	0.03	
TOTAL SUSPENDED SOLIDS	<1.0	<1.0	<1.0	<1.0	6.3	4.4	<1.0	<1.0	<1.0	3	2	
TOTAL HARDNESS	400	412	330	264	326	367	295	356	347	117	351	
TOTAL SULFATES	80	78	96	72	84.8	80	104	82.7	73.6	71	96	
SPECIFIC CONDUCTANCE	640	670	720	719	710	795	840	720	680	462	679	
NITRATES	-	-	-	-	-	-	-	4.24	3.27	0.8	3.19	

	W-37											
	10-8-89	3-12-90	6-14-90	8-29-90	10-8-89	3-12-90	6-14-90	9-10-90				
pH	5.94	6.55	7.6	7.41	7.35	7.32	7.5	6.81				
TOTAL ACIDITY	33.1	22.1	3	34.1	11.8	17.1	3.7	43.6				
TOTAL ALKALINITY	21.6	28.9	21.8	65	176	212	28.5	213.4				
TOTAL IRON	<.02	2.21	2.07	2.09	0.09	5.12	3.11	3.21				
TOTAL MANGANESE	<.02	0.06	0.12	0.04	<.02	0.27	0.14	0.18				
TOTAL SUSPENDED SOLIDS	12.5	14.1	16	11	<1.0	175	41	41				
TOTAL HARDNESS	8.9	27.4	35	39	202	212	197	213				
TOTAL SULFATES	53.6	51.2	80	59	46.4	54.4	59	68				
SPECIFIC CONDUCTANCE	190	205	287	231	520	500	473	432				
NITRATES	-	2.89	3.17	0.16	-	2.86	2.17	2.28				

ADDENDUM TO PART 2, PAGE 19, E
 THE OHIO VALLEY COAL COMPANY
 POWHATAN NO. 6 MINE
 PERMIT D-0360
 WATER QUALITY COMPARISON - UNDERMINED SOURCES

	W-19											
	2-20-89	3-28-89	4-20-89	5-25-89	6-19-89	7-6-89	9-15-89	12-22-89	3-12-90	6-11-90		
pH	7.7	7.45	7.47	7.32	7.45	7.23	7.3	7.69	7.66	7.5		
TOTAL ACIDITY	4.8	8.47	7.7	8.4	16	8	25.7	12.4	6.7	9.7		
TOTAL ALKALINITY	117	133	123	155	140	138	209	113	105	58		
TOTAL IRON	0.13	0.09	0.42	0.44	0.06	0.3	0.07	0.19	0.13	0.19		
TOTAL MANGANESE	0.04	<.02	0.02	0.02	<.02	<.02	<.02	0.02	0.03	0.02		
TOTAL SUSPENDED SOLIDS	3.1	<1.0	6	<1.0	1.3	3.8	<1.0	<1.0	<1.0	3		
TOTAL HARDNESS	176	149	30	82	70	80	205	94.2	125	117		
TOTAL SULFATES	54	41.6	38.4	38.4	37.6	36	42.7	36	59.2	71		
SPECIFIC CONDUCTANCE	370	325	232	368	380	372	520	310	350	462		
NITRATES	-	-	-	-	-	-	-	3.99	0.76	0.8		

	W-32											
	2-21-89	3-28-89	4-20-89	5-25-89	6-19-89	7-6-89	3-12-90	6-11-90	9-20-90			
pH	7.27	7.47	7.35	7.45	7.14	6.93	7.39	7.6	7.59			
TOTAL ACIDITY	11.2	8.91	20.8	10.8	25	27	12.6	27.3	21.4			
TOTAL ALKALINITY	222	209	209	217	109	190	222	149	136.1			
TOTAL IRON	0.02	0.03	0.04	0.03	0.72	0.18	1.42	1.17	1.01			
TOTAL MANGANESE	0.04	<.02	<.02	<.02	0.02	0.06	0.06	0.09	0.08			
TOTAL SUSPENDED SOLIDS	1.6	<1.0	6	<1.0	13.3	1.8	<1.0	3	8			
TOTAL HARDNESS	268	238	169	149	46.1	145	246	219	216			
TOTAL SULFATES	40	40	37.6	36.8	41.6	54	36	48	53			
SPECIFIC CONDUCTANCE	500	440	348	512	328	553	490	468	487			
NITRATES	-	-	-	-	-	-	0.5	0.56	0.81			

ADDENDUM TO PART 2, PAGE 19, E
 THE OHIO VALLEY COAL COMPANY
 POWHATAN NO. 6 MINE
 PERMIT D-0360
 WATER QUALITY COMPARISON - UNDERMINED SOURCES

	W-38	10-13-89	3-12-90	6-11-90	9-20-90
pH		7.35	7.39	7.3	7.57
TOTAL ACIDITY	SU				
	eq/l (CaCO ₃)	11.8	12.6	9.05	78.3
TOTAL ALKALINITY	eq/l (CaCO ₃)	176	222	19.4	189.3
TOTAL IRON	eq/l	0.09	1.42	6.2	5.41
TOTAL MANGANESE	eq/l	<.02	0.06	0.17	0.23
TOTAL SUSPENDED SOLIDS	eq/l	<1.0	<1.0	13	3
TOTAL HARDNESS	eq/l (CaCO ₃)	202	246	203	198
TOTAL SULFATES	eq/l	46.4	36	40	44
SPECIFIC CONDUCTANCE	uMho/cm	520	490	497	464
NITRATES	eq/l	-	0.5	2.05	2.13

	SD-11	2-21-89	3-28-89	4-20-89	5-25-89	6-20-89	7-6-89	9-15-89	10-7-89	3-14-90	6-11-90	8-29-90
pH		7	7.14	7.07	7.06	6.95	6.76	6.82	7.02	7.15	7.4	7.29
TOTAL ACIDITY	SU											
	eq/l (CaCO ₃)	6.8	13.9	26.2	28	26	35.2	19.8	18.1	22.9	9.9	48.3
TOTAL ALKALINITY	eq/l (CaCO ₃)	65	130	133	163	162	174	162	171	158	237	178
TOTAL IRON	eq/l	0.5	0.15	0.02	0.02	<.02	0.06	0.04	<.02	0.04	0.06	0.06
TOTAL MANGANESE	eq/l	0.04	<.02	<.02	<.02	<.02	0.04	<.02	<.02	<.02	0.02	0.02
TOTAL SUSPENDED SOLIDS	eq/l	12.8	<1.0	10	<1.0	<1.0	5.1	<1.0	<1.0	<1.0	9	2
TOTAL HARDNESS	eq/l (CaCO ₃)	128	159	60	91	120	127	163	175	176	184	171
TOTAL SULFATES	eq/l	59	51.2	58.4	50.4	45.3	49	56	52	62.4	69	65
SPECIFIC CONDUCTANCE	uMho/cm	250	360	271	420	384	470	410	410	450	472	461
NITRATES	eq/l	-	-	-	-	-	-	-	-	<.1	0.01	0.05

ADDENDUM TO PART 2, PAGE 19, E
 THE OHIO VALLEY COAL COMPANY
 POWHATAN NO. 6 MINE
 PERMIT D-0360
 WATER QUALITY COMPARISON - UNDERMINED SOURCES

	Sp-20											
	2-21-89	3-29-89	4-20-89	5-24-89	6-19-89	7-6-89	3-12-90	6-14-90	9-19-90			
pH	7.16	7.24	7.27	6.9	7.13	7.09	7.28	7.5	7.91			
TOTAL ACIDITY	12.6	8.76	21	30	29.8	29	20.5	20.6	34.2			
TOTAL ALKALINITY	148	179	208	193	97.6	189	203	197	184.7			
TOTAL IRON	0.23	0.07	0.04	0.77	0.02	0.11	0.04	0.08	0.12			
TOTAL MANGANESE	0.02	<.02	<.02	0.03	<.02	<.02	0.03	0.02	0.08			
TOTAL SUSPENDED SOLIDS	6	<1.0	4	<1.0	<1.0	1.8	1.0	8	12			
TOTAL HARDNESS	236	283	183	192	220	225	308	297	268			
TOTAL SULFATES	65	65	65.4	67.2	105	64	75.2	78	81			
SPECIFIC CONDUCTANCE	470	580	409	654	630	640	615	574	561			
NITRATES	-	-	-	-	-	-	3.55	3.51	2.87			

ADDENDUM TO PAGE 19, PART 2, E
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
PERMIT D-0360

HYDROLOGIC DETERMINATION

Based on the information submitted in this application, the enclosed probable hydrologic consequences may be expected. Although the overall hydrologic regime will not be affected, individual sources of ground and surface water may be temporarily disrupted. That is, individual wells, springs, or streams may suffer significant water loss. However, this effect is expected to be temporary. Sources that are affected permanently will be replaced by OVCC at its own expense. The quality of the surface and ground water in the proposed mining and adjacent area is not expected to be changed in the long term as a result of the proposed mining activities. Specifically, the levels of pH, iron, manganese, total suspended solids, and total dissolved solids are not expected to vary from their original levels.

However, these parameters may temporarily be changed. If these changes are significant enough to cause the source to be unusable, OVCC will replace the source temporarily (within 24 to 48 hours) and permanently (within 2 years) both at the expense of OVCC.

Some temporary changes to individual ground water and surface water source availability are anticipated. Wells and springs may go dry, streams may flow less, ponds may de-water. However, the effect on sediment yield, acidity, total suspended and dissolved solids, and flooding are expected to be minimal if any.

The effects are expected to change within about two years as the localized water table reaches equilibrium again. On a temporary basis, water will be provided for all developed ground water sources and for surface water sources that are used at OVCC's expense. Ponds and streams with visible cracks that are draining water will be repaired. Permanent replacement supplies will be provided if an individual source is permanently affected. OVCC will bear the entire cost of both temporary and permanent water replacement.

ADDENDUM TO PAGE 19, PART 2, E
THE OHIO VALLEY COAL COMPANY
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The quality of the surface and ground water in the proposed mining area is not expected to be changed in the long term as a result of the mining activities. Specifically, the levels of pH, iron, manganese, total suspended solids, and total dissolved solids are not expected to vary from their original levels.

The Ohio Valley Coal Company (OVCC) fully recognizes the rights of surface and ground water users. However, OVCC also realizes that its mining will probably disrupt individual developed sources of the surface and ground water in the area for a period of time. OVCC is committed to providing both interim and permanent replacement water to users of surface and ground water. OVCC will bear the cost of providing both interim and permanent replacement water.

As a result of the mining in the proposed permit area, individual surface and ground water developed sources are expected to be temporarily disrupted to the extent that shallow wells may be de-watered, streams may become dry, and springs may develop at a lower elevation than before. These movements of the saturated zones are somewhat unpredictable, and as such, OVCC cannot protect the quantity in these locations. However, alternative water supplies will be provided for those supplies used by the landowner in similar quantities to pre-mining conditions. Because it cannot be determined at what elevation the water will return, the alternative sources of water cannot be fully described here. However, alternatives include the list shown in the Addendum to Page 19, Part 2, F.

ADDENDUM TO PAGE 19, PART 2, F(1)
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
PERMIT D-0360

DEVELOPED SUPPLIES OF GROUND AND SURFACE WATER THAT MAY BE
IMPACTED AS A RESULT OF THE PROPOSED OPERATION

Of the supplies listed in Attachments 14C and 14D, the following are expected to be impacted as a result of the proposed operation:

W-48
W-45
W-44
W-43
W-34
W-27
W-33
W-26
W-28
SP-25
SP-26
SP-23
SP-24
P-1

- F. (2) If contamination, diminution, or interruption may result, submit an addendum identifying the alternative sources of water supply that could be developed to replace the existing sources including information on water availability and suitability of alternative sources for existing pre-mining uses and postmining land use.

See Addendum to Page 19, Part 2, F

G. LAND USE INFORMATION-Permit Area

- (1) Describe the uses of the land within the proposed permit area existing at the time of the filing of this permit application and provide a map which delineates the area of each land use.

Not Applicable - No Permit Area

- (2) Was the land use described in item G(1) above changed within five years before the anticipated date of beginning this proposed mining operation?
_____ Yes, _____ No. If "yes," describe the historic use of the land.

Not Applicable - No Permit Area

- (3) Analyze the capability of the land within the proposed permit area before any mining to support a variety of uses, giving consideration to soil and foundation characteristics, topography, vegetative cover, and hydrology of the proposed permit area.

Not Applicable - No Permit Area

- (4) Analyze the productivity of the land within the proposed permit area before any mining to include average yields obtained under high level of management.

Not Applicable - No Permit Area

- (5) Is any land within the proposed permit area classified as prime farmland? _____ Yes, _____ No.

Not Applicable - No Permit Area

ADDENDUM TO PAGE 19, PART 2, F(2)
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
PERMIT D-0360

ALTERNATIVE WATER SUPPLY INFORMATION

Adjacent Areas Above Full Recovery Mining

The PHC identified herein indicate a potential for diminution and/or interruption of ground water supplies in areas above and contiguous to full recovery mining operations. However, no contamination of such water supplies is expected.

Notwithstanding its mining rights and without waiving any of its mining rights, where such diminution or interruption results from full recovery mining, The Ohio Valley Coal Company will repair and replace such affected water source(s) in the adjacent area at its own expense in a manner mutually satisfactory to OVCC, the surface owner, and the Division of Reclamation, and to a level sufficient to meet the surface owner's pre-mining requirements will be determined by monitoring information gathered in accordance with the Monitoring Plan.

Past experience indicates that the majority of subsidence (that detectable with surveying equipment) is complete within about 45 days after the longwall passes under the area.

The steps which OVCC would take to repair or replace affected water sources in the adjacent area include:

1. Repair damaged cisterns after OVCC has determined that subsidence is complete;
2. On a site specific basis, redrill existing wells, drill new wells, or connect the surface owner to public water supplies;
3. On a site specific basis, developed springs will be replaced by a farm pond built according to accepted engineering practices, drilling of a new well, or development of another spring in close proximity to the original spring;
4. Repair damaged farm ponds so as to be comparable to their pre-mining conditions;

5. Provide interim water supplies until affected water sources are replaced. Interim supplies may include hauled water or a tap to public water supplies, if available;
6. Such other proven, cost effective, and reasonable techniques as OVCC may now, or in the future, deem appropriate.

It is OVCC's intention to fully bear the cost of both interim and permanent water replacement. If contamination, diminution, or interruption of a property owner's underground or surface water supply used for domestic, agricultural, industrial, or other legitimate use occurs as a proximate result of the mine's operation, the OVCC will undertake within 48 hours the necessary measures to repair or replace such water supply at OVCC's expense and to furnish, at the OVCC's expense, an alternate water supply until repair or replacement is completed or will reimburse the property owner for the reasonable cost of obtaining a water supply from the date of any such contamination, diminution, or interruption until the supply is repaired or replaced. OVCC will provide the affected property owner with no less of an available water supply than the property owner had before mining, based on the pre-mining survey. OVCC will notify the Division of Reclamation immediately after it has been informed of the loss of developed water (ground or surface water) due to its mining activities.

As previously stated, the elevation of alternative water sources is unpredictable until the water system in the area again attains equilibrium after mining. Therefore, the alternative water supplies to be developed will be identified when the need arises. Those supplies may include but not be limited to redevelopment of an existing well, spring, or pond, or replacement of the source with the County Water System. The County Water System has been contacted by OVCC and has assured us that there is capacity to replace each developed source with county water. A letter to that effect is enclosed.

If a property owner believes that his or her underground or surface water supply which is used for domestic, agricultural, industrial, or other legitimate use has been contaminated, diminished, or interrupted as a proximate result of the mine's operation, he or she should notify OVCC by calling (614) 926-1351. OVCC will make a determination of liability no later than sixty (60) days after notification of the contamination, diminution, or interruption of a water supply as a proximate result of the mine's operation.

Work on furnishing a temporary alternate water supply will begin within 48 hours after OVCC learns of the contamination, diminution, or interruption to the domestic, agricultural, industrial, or other legitimate-use water supply proximately caused by the mining operation. OVCC will pay all costs associated with this temporary, alternate water supply. Permanent repair or replacement of an affected water supply shall be completed no later than eighteen (18) months after it has been determined that the supply has been contaminated, diminished, or interrupted as a proximate result of the mine's operation. All costs of repair and/or replacement to provide the affected property owner with no less of an available water supply than the property owner had before mining, based on the pre-mining survey, shall be paid for by OVCC.

In repairing or replacing a property owner's underground or surface water supply used for domestic, agricultural, industrial, or other legitimate use which is damaged as a proximate result of the mine's operation, OVCC's first preference is to repair the affected supply. If that is not feasible, OVCC's second preference is to replace the affected supply with a like supply. For example, a damaged pond, if not repairable, would be replaced with a new pond. If that is not feasible, OVCC will replace the affected supply with a similar supply. For example, a damaged dug well, if not repairable or replaceable with another dug well, would be replaced by a potable-type cistern, a drilled well or a similar supply.

It should be recognized that property sites differ in such elements as geologic and hydrologic composition. Thus, the determination of whether repair of an affected water supply is feasible or whether replacement by a specific type of water supply is feasible must be made on a case-by-case, site specific basis. OVCC, in the past, has always attempted to consult and negotiate with the affected property owner concerning the selection of the type of water replacement and its site. This is done at the request of property owners who prefer this procedure to that of OVCC making unilateral decisions about replacement supplies and sites. OVCC, if requested by the Division, will make these decisions unilaterally.

In some cases, OVCC reaches pre-subsidence agreements with landowners, who are normally represented by counsel and in all cases have full opportunity to consult with counsel or anyone else of their choosing. These agreements, which are typically negotiated by OVCC employees, normally cover all potential property damage claims. In situations where such an agreement is reached, OVCC will comply with the water replacement terms contained in the agreement.

ADDENDUM TO PAGE 19, PART 2, F(2)
PAGE FOUR

In any situation where OVCC determines that the contamination, diminution, or interruption of a water supply was not proximately caused by the mining operation, based on evidence such as the proximity of the supply to the mining operation, site specific geologic and surface conditions, or climatological conditions, OVCC will provide the Division of Reclamation with notice of its determination and the proof in support of that determination to allow the Division to issue a Chief's Order deciding the issue. This Chief's Order is then appealable in accordance with O.R.C. §1513.13. The landowner's domestic water supply will continue during the time OVCC seeks review of this matter pursuant to O.R.C. §1513.13. If it is determined that contamination, diminution, or interruption of a supply is the proximate result of the mine's operation, OVCC shall bear all costs of furnishing temporary water. OVCC reserves the right to proceed against the landowner to recover costs incurred if it is determined that OVCC is not liable for the contamination, diminution, or interruption of the affected water supply.

- G. (6) Describe the use of the land within the permit area, including the creation of permanent water impoundments, that is proposed to be made of the land following reclamation, including information regarding the utility and capacity of the reclaimed land to support a variety of alternative uses.

Not Applicable - No Permit Area

- (7) Are there existing land use classifications under local law of the proposed permit area?
Yes, No. If "yes," describe the land use classification and submit as an addendum to the permit application, the comments of the governmental agency which would have to initiate, implement, approve or authorize the proposed use of the land following reclamation. If "no," describe the sources of information on which the determination was made.

Not Applicable - No Permit Area

- (8) Submit as an addendum a copy of the comments from the legal or equitable owner of record of the surface of the proposed permit area concerning the proposed land use.

Not Applicable - No Permit Area

- (9) Describe the consideration which has been given to making all of the proposed coal mining activities consistent with surface owner plans and applicable state and local land use plans and programs.

Not Applicable - No Permit Area

- (10) Describe how the proposed land use is to be achieved and the necessary support activities that may be needed to achieve the proposed land use.

Not Applicable - No Permit Area

- G. (11) Is the postmining land use to be different from the premining land use? Yes, No. If "yes," submit as an addendum to the permit application, the plans and findings required by paragraph (D) of rule 1501:13-9-17 of the Administrative Code.

Not Applicable - No Permit Area

- (12) Has the proposed permit area been previously mined? Yes, No. If "yes," provide the following information, if available.

- (a) Type of mining method
- (b) Coal seam mined
- (c) Non coal mineral mined
- (d) Extent of mining acres
- (e) Approximate dates
- (f) Land use preceding mining

Not Applicable - No Permit Area

H. PRIME FARMLAND INVESTIGATION-Permit Area

- (1) Does the proposed permit area include any land that is prime farmland, taking into consideration the negative determinations listed in paragraph (L)(2) of rule 1501:13-4-13 of the Administrative Code?

 Yes, No.

Not Applicable - No Permit Area

- (2) If the response to item H.(1) is "yes," submit Attachment 15.
- (3) If the response to item H.(1) is "no," submit Attachment 16.

PART 3 RECLAMATION AND OPERATIONS PLAN

A. GENERAL REQUIREMENTS-Permit Area (Item A.(1) and A.(2)-
Permit and Underground Workings)

- (1) Describe the type and method of coal mining procedures for this application. Explain how these procedures will maximize the use and conservation of the coal resources. Entry Development will be used to develop for longwall; although recovery for this mining method is limited, recovery for the longwall is high, making maximum use of the reserves.
- (2) Indicate the anticipated annual and total production of coal from this proposed operation.

Annual 3.1 million Total 31 million

- (3) Will this operation be combined with surface coal mining activities to the extent that contemporaneous reclamation of areas disturbed by surface mining will be delayed or such that the underground workings will be within 500 feet of the surface mining activities?
 Yes, X No. If "yes," submit Attachment 30.
- (4) Are experimental mining practices to be employed in the proposed mining operations? Yes, X No. If "yes," submit as an addendum to the permit application, the description, maps, and plans required by paragraph (B) of rule 1501:13-4-12 of the Administrative Code.
- (5) Are mountaintop removal mining practices to be employed in the proposed mining operations? Yes, X No. If "yes," submit as an addendum to the permit application the information required by paragraph (C) of rule 1501:13-4-12 of the Administrative Code.
- (6) Are the natural pre-mining slopes within the permit area in excess of twenty (20) degrees?
 Yes, X No. If "yes," submit an addendum demonstrating compliance with the steep slope mining provisions of paragraph (D) of rule 1501:13-4-12 and 1501:13-13-05 of the Administrative Code.
- (7) Is augering proposed within the permit area?
 Yes, X No. If "yes," submit Attachment 18.
- (8) Are variances from approximate original contour to be employed for the proposed underground mining surface operations? Yes, X No. If "yes," submit an addendum to the permit application demonstrating compliance with paragraph (E) and/or (K) of rule 1501:13-4-12 of the Administrative Code.

- A. (9) Will access to the underground workings be gained through a drift entry? _____ Yes, _____ No. If "yes," provide as an addendum sufficient information to determine the location of the entry relative to the highest elevation of the coal reserve. Is the drift entry located so as to eliminate the potential for a gravity discharge? _____ Yes, _____ No. If "no," the applicant must demonstrate that the coal seam is not acid or iron producing. Provide an analysis of the strata immediately above and below the coal, and the coal seam itself, sufficient to demonstrate that the water quality from the entry will meet effluent limitations without treatment.
- Not Applicable - No Permit Area
- (10) For entries to underground workings other than drift entries, provide as an addendum sufficient information to determine the location of the entry relative to the coal reserve. Are the entries located so as to eliminate the potential for a gravity discharge? _____ Yes, _____ No. If "no," provide the following demonstration:
- Not Applicable - No Permit Area
- (a) the gravity discharge will meet effluent limitations without treatment, or
- (b) the water will be treated to meet effluent limitations and provisions will be made for consistent maintenance of the treatment facility throughout the anticipated period of gravity discharge.
- (11) Will the permanent entry seals be designed to withstand the maximum anticipated hydraulic head when the operations are abandoned? _____ Yes, _____ No. If "yes," submit the appropriate information demonstrating that this will be accomplished. If "no," provide a typical plan for the seals to be used to close the mine entries pursuant to applicable state and federal regulations.
- Not Applicable - No Permit Area
- (12) Submit an addendum describing the construction, modification, maintenance, and removal (unless to be retained for postmining land use), including the proposed engineering techniques and major equipment to be used, of the following facilities:
- (a) dams, embankments, and other impoundments. Do any of the plans for water, sediment or slurry impoundments meet the requirements of 30 CFR 77.216? _____ Yes, _____ No. If "yes," submit as an addendum a plan that addresses each of the requirements in 30 CFR 77.216-2.

Not Applicable - No Permit Area

- A. (12) (b) overburden and topsoil handling and storage areas and structures.
 Not Applicable - No Permit Area
- (c) coal removal, handling, storage, cleaning, and transportation areas and structures; including, but not limited to, preparation plants, beltlines, tipples, rail sidings, and primary roads. For roads, conveyors and rail systems, submit an addendum describing the information required pursuant to paragraph (L) of rule 1501:13-4-14 and 1501:13-10-01 of the Administrative Code.
 Not Applicable - No Permit Area
- (d) spoil removal, handling, storage, transportation, and disposal areas and structures, including underground development waste or excess spoil disposal sites. If underground development waste or excess spoil is to be generated, submit an addendum describing the information required by paragraphs (O) and (P) of rule 1501:13-4-14 and 1501:13-9-07 of the Administrative Code.
 Not Applicable - No Permit Area
- (e) mine facilities such as portal/shaft development, boreholes, de-gas holes, vents, office or shop buildings and maintenance facilities.
 Not Applicable - No Permit Area
- (f) water and air pollution control facilities.
- (13) Provide an estimate of the cost per acre to reclaim the permit area.
 Not Applicable - No Permit Area
- (14) Will the proposed operation include any of the following:
 Not Applicable - No Permit Area
- (a) disposal of coal mine waste from a wash plant, tipple, or other source? Yes, No. If "yes," submit Attachment 28 and, if applicable, the information required by paragraph (H) of rule 1501:13-4-14 of the Administrative Code.
- (b) disposal of fly ash or other noncoal wastes? Yes, No. If "yes," submit an addendum which addresses the disposal material and a detailed disposal plan, pursuant to paragraph (E) of rule 1501:13-9-09 of the Administrative Code.
- (c) return of slurry or other mine waste or material into the abandoned underground workings?
 Yes, No. If "yes," comply with provisions contained in paragraph (N) of rule 1501:13-4-14 and paragraph (Q) of 1501:13-9-04 of the Administrative Code, and submit copies of the required MSHA approvals as an addendum.

B. EXISTING STRUCTURES-Permit Area

- (1) Are any existing structures proposed to be used in connection with or to facilitate the coal mining and reclamation operation? Yes, No. If "yes," submit as an addendum to the permit application a description of each such structure. The description shall include the information required by paragraph (B) (1) of rule 1501:13-4-14 of the Administrative Code.
- Not Applicable - No Permit Area
- (2) Are any existing structures proposed to be modified or reconstructed for use in connection with or to facilitate the coal mining and reclamation operation? Yes, No. If "yes," submit as an addendum to the permit application, a compliance plan for each such structure. The plan shall include the information required by paragraph (B) (2) of rule 1501:13-4-14 of the Administrative Code.

Not Applicable - No Permit Area

C. BLASTING-Permit Area

Will blasting occur within 25 feet of the surface during shaft and portal development or other on-site development? Yes, No. If "yes," submit Attachment 29.

Not Applicable - No Permit Area

D. RECLAMATION PLAN - GENERAL REQUIREMENTS-Permit Area (ITEM D. (12)-Permit, Shadow, and Adjacent Area)

- (1) Provide a detailed timetable for the completion of backfilling and grading for each mining year.

Not Applicable - No Permit Area

- (2) Provide a detailed timetable for the completion of resoiling for each mining year.

Not Applicable - No Permit Area

- (3) Provide a detailed timetable for the completion of planting for each mining year.

Not Applicable - No Permit Area

- (4) Describe the plan for backfilling, compacting and grading of the disturbed permit area, including the disposal of all mine generated debris.

Not Applicable - No Permit Area

- D. (5) Submit an addendum describing the plan for the removal, storage, redistribution and stabilization of topsoil, subsoil, or approved alternative resoiling material to meet the requirements of rule 1501:13-9-03 of the Administrative Code. If alternative resoiling material is to be used, submit Attachment 19.
- (6) Not Applicable - No Permit Area
Provide the following information for the revegetation plan:
- (a) Schedule for revegetation to include planting of temporary vegetation.
Not Applicable - No Permit Area
- (b) List the species and amounts per acre of seeds and seedlings to be used.
Not Applicable - No Permit Area
- (c) Describe the methods to be used in planting and seeding.
Not Applicable - No Permit Area
- (d) Describe the mulching techniques.
Not Applicable - No Permit Area
- (7) Describe the soil testing plan for evaluation of the results of topsoil handling and reclamation procedures related to revegetation.
Not Applicable - No Permit Area
- (8) Describe the measures to be employed to handle and place acid or toxic-forming materials in accordance with paragraph (J) of rule 1501:13-9-04, and paragraph (J) of rule 1501:13-9-14 of the Administrative Code.
Not Applicable - No Permit Area
- (9) Describe measures, including appropriate cross-sections and maps, to be used to plug, case or manage mine openings or bore holes other than those entries utilized to gain access to the underground workings, pursuant to rule 1501:13-9-02 of the Administrative Code.
Not Applicable - No Permit Area

- D. (10) Is the reclamation plan consistent with local physical, environmental, and climatological conditions?

____ Yes, ____ No.

Not Applicable - No Permit Area

- (11) Identify any other applicable air and water quality laws and regulations and health and safety standards and describe the steps to be taken to comply with each.

Not Applicable - No Permit Area

- (12) Submit an addendum describing the plan for minimizing to the extent possible and using the best technology currently available disturbances and adverse impacts of the operation on fish and wildlife and related environmental values and achieving enhancement of such resources where practical for the permit, shadow, and adjacent areas.

See Addendum to Page 28, D(12)

E. RECLAMATION PLAN-PROTECTION OF HYDROLOGIC BALANCE-Permit and Adjacent Area

Describe the measures to be taken during and after the proposed surface mining operations to:

- (1) minimize disturbance to the hydrologic balance, including quality and quantity, within the permit and adjacent areas and to prevent material damage outside the permit area;

See Addendum to Part 2, Page 28E(1-3)

- (2) protect the rights of present users of surface and ground water;

See Addendum to Page 2, Page 28E(1-3)

- (3) avoid acid or toxic drainage.

See Addendum to Page 2, Page 28E(1-3)

Addendum to Part 2, Page 28, D(12)
The Ohio Valley Coal Company
Powhatan No. 6 Mine
Permit D-0360

The proposed longwall mining operation is not expected to impact fish, wildlife, and other related environmental values. The longwall will not undermine any streams where fish live. Wildlife has never been shown to be affected by longwall mining. If landslides occur over the mining area, The Ohio Valley Coal Company will restore the land to a condition equal to its original value and reasonably foreseeable use.

Addendum to Part 2, Page 28, E(1-3)
The Ohio Valley Coal Company
Powhatan No. 6 Mine
Permit D-0360

Reclamation Plan - Protection of Hydrologic Balance

The hydrologic balance is not expected to change as a result of the proposed longwall mining operation in the long term. Temporarily, the depth below the surface of ground water will increase as a result of increasing the number of cracks in the local rock units. The static level of the ground water will re-establish itself within 18 months to 2 years after mining. At that time, ground water will be available in quantity at least as great as before mining. Because of increased porosity due to the cracking caused by longwall mining, the quantity of ground water that is available to users will probably increase. Minor surface cracking over longwall areas will eventually heal, causing the ground to capture approximately the same percentage of rainfall as before. Surface water drainage and evaporation are not expected to be impacted by longwall mining. The monitoring data obtained for the ground and surface water sources over the longwall areas at the Powhatan No. 6 Mine indicate there will be no deleterious effects of the longwall mining on water quality. Therefore, the hydrologic balance outside the permit area will be protected.

The rights of present users of surface and ground water will be maintained through the water replacement plan found in the Addendum to Part 2, Page 19, F. It is anticipated that within two years, ground water will re-establish itself so that wells and springs can be replaced. Surface water drainage is not expected to be impacted by longwall mining.

Acid or toxic drainage are not expected to be a problem at the Powhatan No. 6 Mine. The No. 8 seam is entirely below drainage, and the openings to the surface are located high enough above the seam that they will not experience hydraulic pressure from the seam. The major watershed of this area, Captina Creek, is at the elevation of the mine in the application area at a distance of over 5 miles from the mine. Acid or toxic drainage is not expected to enter the waters of the State.

F. GROUND WATER AND SURFACE WATER MONITORING PLAN-Permit and Shadow Area

Based upon the probable hydrologic consequences determination and analysis of all baseline hydrologic, geologic, and other information submitted in this application, address the following items in accordance with paragraph (F) of rule 1501:13-4-14 and paragraph (N) of rule 1501:13-9-04 of the Administrative Code.

- (1) In addition to the quality and quantity parameters required for quarterly monitoring and NPDES monitoring, will any other parameters be monitored? Yes, No. If "yes," indicate the parameter(s) and the site(s) where such monitoring will occur.

See Addendum to Page 29, Part 2, F

- (2) Do you propose or anticipate the need for a variation in the required monitoring frequency for ground and surface water sites and monthly monitoring for NPDES? Yes, No. If "yes," describe the variation in frequency and the monitoring sites to be affected.

See Addendum to Page 29, Part 2, F

- (3) Describe the plan for collection, recording, and reporting of all surface and ground water quality and quantity monitoring data, including data collected for the NPDES program.

See Addendum to Page 29, Part 2, F

G. DIVERSIONS AND DRAINAGE CONTROLS-Permit Area

- (1) Will the proposed coal mining activities result in diversions of overland flow away from the disturbed areas? Yes, No. If "yes," describe, including maps and cross sections, the diversion to be constructed to achieve compliance with paragraph (I) of rule 1501:13-4-14 of the Administrative Code.

Not Applicable -- Not a Permit Area.

GROUND WATER AND SURFACE WATER MONITORING PLANS

1. Ground Water Monitoring Plan

All developed ground water supplies will be monitored quarterly for quality and monthly for quantity for at least one year prior to full recovery mining, and at least one year subsequent to mining. Weekly quantity monitoring will be conducted whenever the longwall face is within three weeks of undermining the supply and no less than three weekly pre-mining and post-mining measurements will be made. Ground water supplies located within 500 feet (measured horizontally) of the perimeter of the active longwall panel will be monitored as if they were located on the panel. Monitoring will be continued for at least one year subsequent to full recovery mining contingent upon review by the Division. Daily precipitation data will be submitted to evaluate spring flow.

2. Surface Water Monitoring Plan

The surface water locations depicted on the application/hydrology map will be sampled monthly for flow and quarterly for quality. The quality requirements of OAC 1501:13-3-14(F)(2) and the other QMR parameters as stated on the QMR report sheets will apply to the surface water analysis. Each surface monitoring station will be monitored for at least one year prior to full coal recovery mining. Monitoring will be continued for at least one year subsequent to full recovery mining contingent upon review by the Division. Daily precipitation data will be submitted to evaluate stream flow.

With each quarterly monitoring report of ground and surface water, a map depicting the progression of the longwall face will be attached to indicate the sampling points in the full recovery areas. Notes will be submitted indicating the position relative to the longwall face, with "+" indicating station is in advance of the face and a "-" indicating a position behind the face. An attempt will be made to sample as outlined above, however, some sources may not be accessible. These locations, if encountered, will be documented in the quarterly reports. All samples will be taken as outlined to the extent that existing well construction allows. Any samples that are unobtainable will be documented as such in the quarterly report. Quarterly sampling will include analysis for nitrates.

ADDENDUM TO PART 2, PAGE 29, F
PAGE TWO

OVCC will monitor all ground and surface locations in accordance with the monitoring plan outlined above regardless of the aquifers and/or saturated zones that they access. All developed supplies have been identified and have been indicated on the application/hydrology map.

ADDENDUM TO PAGE 19, PART 3, PAGE 29,F(3)
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
PERMIT D-0360

ANNUAL MAP

A mine map will be submitted every six months to coincide with the permit anniversary date. For ground water monitoring, the face location of the active panel will be provided quarterly with the monitoring data. The maps will contain the following:

1. Scale the same as the Division of Mines submittal, or 1 in = 500 ft.
2. All base map requirements pursuant to ORC 4153.03.
3. Extraction ratios for completed sections.
4. Coal elevations.
5. Surface structures.
6. Locations of subsidence and water monitoring stations.
7. Mine height (extraction thickness).
8. Completion/abandonment dates for completed sections.

I. MINING NEAR OR THROUGH A PUBLIC ROAD-Permit Area

If the response to Part 1, item D(6) of the permit application is "yes," describe the measures to be used to ensure that the interests of the public and landowners are protected.

J. SUBSIDENCE CONTROL SURVEY-Shadow Area

- (1) Is this a full coal recovery operation? X Yes, No.
If "yes," complete Attachment 31, Subsidence Control Survey, and items J(2) and (3) below.
- (2) Does the shadow area contain any of the structures or facilities listed in 1501:13-12-03(J)(1-3)?
 Yes, X No. If "yes," complete Attachment 32, Protection of Specific Structures, and specifically identify the structures or facilities on the application map.
- (3) Are any aquifers or bodies of water that serve as a significant water source for any public water supply system present in the shadow area? Yes, X No.
If "yes," complete Attachment 32, Protection of Specific Structures, and specifically identify the areas on the application map.

K. SUBSIDENCE CONTROL PLAN-Shadow Area

- (1) Submit an addendum which describes the method of coal removal, and indicates the size, sequence, and timing of the development of the underground workings.
See Addendum to Page 31, Part 2, K(1)
- (2) Utilizing the application map, specifically indicate areas where planned subsidence mining methods (i.e. longwall or pillar extraction) will be used.
See Application Map
- (3) Utilizing the application map, specifically indicate room-and-pillar mining areas where subsidence will be prevented or minimized.
See Application Map
- (4) Submit as an addendum, for those areas mapped as room-and-pillar mining, the following information:
- (a) the maximum and average overburden thickness.
 - (b) the projected maximum extraction ratios for main, submains, and butt sections, as well as the existing ranges of values for the same areas.
 - (c) projected maximum width of entries and cross cut throughout the mine, as well as the existing ranges of values for the same areas.

ADDENDUM TO PAGE 31, J(1)
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
PERMIT D-0360

RENEWABLE RESOURCES - GROUND WATER RECHARGE

For the mine plan area, it is generally accepted that most of the land area acts as recharge zones. In local settings, recharge occurs directly to ground water table aquifers and in deeper hydrostatigraphic units recharge occurs through leaky aquitards or by movement from more remote areas closer to the land surface. It is accepted that recharge potential or infiltration rates vary substantially in response to soil or rock type, slope, vegetation cover, and other factors. The only areas that are not viewed as recharge areas to one degree or another are discharge zones such as streams, springs, and seeps.

**OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION**

ATTACHMENT 31
(Subsidence Control Survey)

TOVCC 15338

3/90

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 31
(Subsidence Control Survey)

SURFACE OWNER	COUNTY	TOWNSHIP/SECTION	RENEWABLE RESOURCES	STRUCTURES-USE	MAP LOC. KEY (Structures)
Chalmer and Ida Campbell	Belmont	Smith 20, 26	House	Occupied	7
			Barn	Dairy Farm	8
			Various Out Buildings	Dairy Farm	9
Graydon and Sharon Ooten	Belmont	Smith 19, 20	House	Occupied	10
			Well	Domestic	W-27
Stanley and Bonnie Otto	Belmont	Smith 20	House	Occupied	11
Darrell and Donna Grant	Belmont	Smith 20	House	Occupied	12
			Well	Domestic	W-44
Ohio Valley Coal Company	Belmont	Smith 20	Stream	Unused	U22-B, U22-C
Betty L. Dunfee Delmas and Mary Caretti	Belmont	Smith 20	None	None	--
	Belmont	Smith 19, 20	Springs	Livestock	SP-29, SP-30
Delmas & Mary Caretti	Belmont	Smith 19, 20	Pasture	Livestock	37, 38
Delmas & Mary Caretti	Belmont	Smith 19, 20	Cropland	Crops	39, 40
Delmas & Mary Caretti	Belmont	Smith 19, 20	Timber	Wood	15, 16

TOVCC 15339

**OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION**

ATTACHMENT 31
(Subsidence Control Survey)

[illegible]

3/90

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 31
(Subsidence Control Survey)

SURFACE OWNER	COUNTY	TOWNSHIP/SECTION	RENEWABLE RESOURCES	STRUCTURES-USE	MAP LOC. KEY (Structures)
Seaway Coal Co.	Belmont	Smith 25	Timber	--	19
Ohio Valley Coal Albert and Mary Ogilbee	Belmont	Smith 25	Stream	Unused	D-21
Wayne and Barbara Ogilbee	Belmont	Smith 25	Pond	Unused	Note: In p-1 angle of draw.
		Smith 25	House	Occupied	2
			Well	Domestic	W-26
Richard and Vernice Otto	Belmont	Smith 19,20,26	Stream	Livestock	U-21-G
			Spring	Livestock	SP-24
			Spring	Livestock	SP-23
			Well	Domestic	W-34
			Well	Livestock	W-43
			Dairy Barn	Dairy Farm	3
			House	Occupied	4
			House	Unoccupied	5
			Various Out Buildings	Dairy Farm	6

TOVCC 15341

3/90

**OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION**

**ATTACHMENT 31
(Subsidence Control Survey)**

<u>SURFACE OWNER</u>	<u>COUNTY</u>	<u>TOWNSHIP/SECTION</u>	<u>RENEWABLE RESOURCES</u>	<u>STRUCTURES-USE</u>	<u>MAP LOC. KEY (Structures)</u>
Delmas and					
Mary Caretti	Belmont	Smith 19, 20	Stream	Livestock	U22-Q
Ohio Valley					
Coal Company	Belmont	Smith 25, 26	Stream	Unused	U21-A
			Stream	Unused	U21-B
			Millers Run	Unused	D-21
			House	Occupied	1
			Well	Domestic	W-33
Chalmer and					
Ida Campbell	Belmont	Smith 20, 26	Stream	Livestock	U21-F
			Spring	Livestock	SP-27
			Spring	Livestock	SP-28
			Well	Unused	W-48
			Well	Domestic	W-45
			Spring	Livestock	SP-25
			Spring	Livestock	SP-26
			Stream	Livestock	U22-P

TOVCC 15342

ADDENDUM TO PAGE 31, PART 2, K(1)
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
PERMIT D-0360

ENGINEERING AND MINING TECHNIQUES

The Powhatan No. 6 Mine is an operation that uses the longwall method of mining. The engineering and mining techniques for longwall mining are as follows:

1. Longwall mining removes long panels of coal that are 600 to 800 ft. wide and approximately 7000 ft. long. A longwall shearer, a double-drum machine removes the panel by cutting slices of coal along the width of the face. The roof is temporarily supported by double-legged hydraulic supports called shields. The shields are moved forward each time that a slice is cut from the face. The coal is transported from the face by an armored, chain conveyor.

The roof behind the shields is allowed to collapse. Surface subsidence on the order of approximately 60 percent of the mining height occurs when the roof falls.

2. The longwall face is outlined by three entries on each side called gate entries, on the end where the panel starts by several entries called bleeder entries, and on the end where the panel ends by the main or submain entries. These entries are developed using a continuous miner, shuttle cars, and roof bolters. Pillars and concrete block stoppings separate each entry from the next. These entries provide ventilation and belt haulage for the longwall mining section.

- K. (4) (d) the center spacing for entries and cross cuts.
- (e) minimum pillar dimensions for mains, submains, and butt sections, as well as the existing ranges of values for these areas.
- (f) the barrier pillar width between butt sections, as well as the existing ranges of values for the same areas.
- (g) the engineering properties of the clay/shale, or other soft rock material in the roof and floor of the mine.
- (h) measures to be taken on the surface to prevent damage or lessening of the value or reasonably foreseeable use of the surface, if any.
- (i) the minimum pillar safety factor, for protected structures, based upon coal strength and load.
- (j) methods and calculations used to determine the safety factor.
- (5) Submit as an addendum for those areas mapped as full coal recovery mining, the following information:
See Addendum to Page 32, Part 2, K(5)
- (a) for each method to be employed (i.e. longwall or pillar extraction), provide the following:
- i) rate and direction of dip for the coal seam.
 - ii) dimensions of panels or butt sections.
 - iii) thickness of coal to be extracted (mining height).
 - iv) maximum angle of draw.
 - v) maximum anticipated subsidence.
 - vi) width of barrier pillars or chain pillars between sections or panels.
 - vii) the maximum extraction ratio within a pillaring section.

ADDENDUM TO PAGE 32. K(5)
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
PERMIT D-0360

SUMMARY OF SUBSIDENCE MONITORING

In February, 1990, the first longwall panel progressed beneath Smith Township Road 116. The Ohio Valley Coal Company placed subsidence monuments along the road, measured their elevations prior to mining, and on several occasions after the mining was past the road. Figure 1 shows the plan view of the subsidence monuments. The longwall gate section entries are shown on the figure also. Figure 2 shows the subsidence profile that developed. Table 1 shows the monitoring data.

The angle of draw (measured to .02 ft of displacement) was approximately 13 degrees. The angle of draw on the headgate side was identical to the angle on the tailgate side. It should be noted that the surface at the headgate showed signs of some horizontal movement that caused the monuments on the surface to move downhill. This situation caused some of the displacement of the monuments to the north of the angle of draw. However, with the surveying instruments that were used, an accuracy of 0.02 ft. was used, and the displacement north of the angle of draw was minimal.

The longwall passed under the road on February 20, 1990. The first subsidence was observed on February 21, with 99 percent of the maximum subsidence occurring by March 5, 1990 (within 13 days).

The second longwall panel was initially instrumented and the pre-mining elevations were determined. Subsequent measurements have not been made, and a search for the monuments revealed that most of the monuments cannot be found. However, measurements of the monuments over the first panel showed that the ground had experienced displacements as far south as the middle of the first panel. Some of this displacement can be attributed to further consolidation of the rublized zone. The monuments over the 5 West entries have subsided approximately 8 to 9 inches over the initial subsidence.

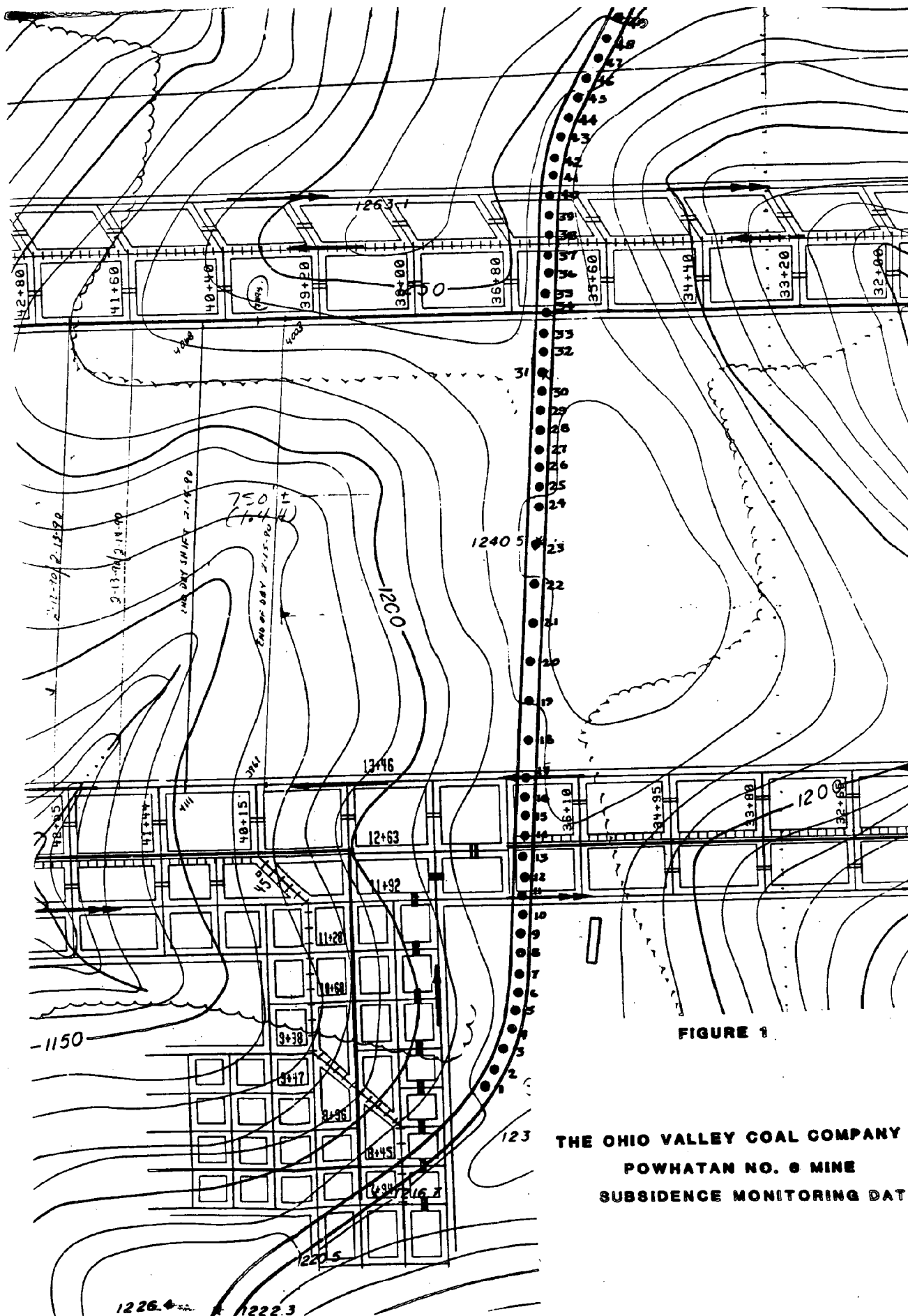


FIGURE 1

THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
SUBSIDENCE MONITORING DATA

FIGURE 2
SUBSIDENCE PROFILE

FIRST LONGWALL PANEL

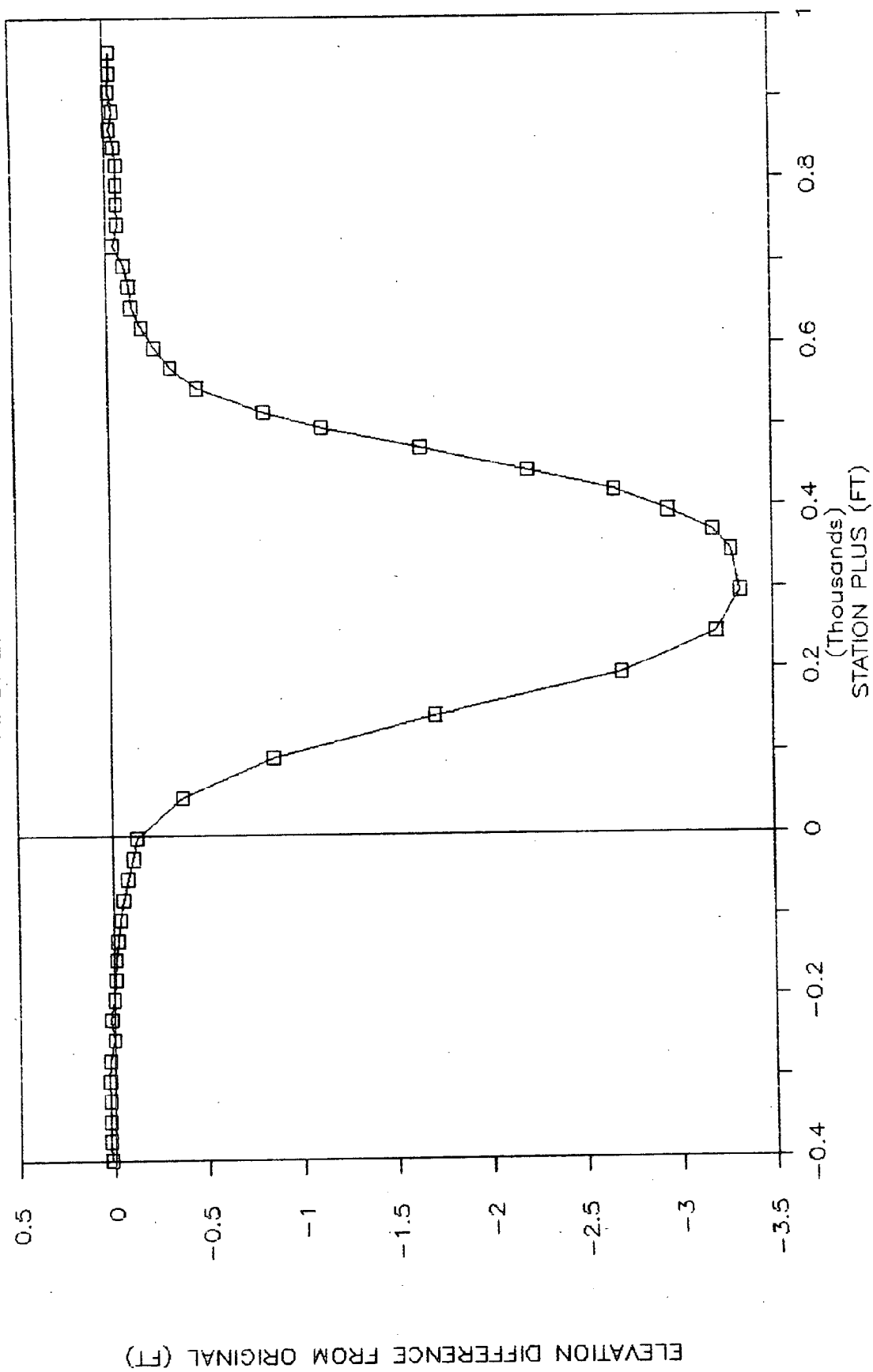


TABLE 1
SUBSIDENCE DATA COLLECTED OVER "FIRST" PANEL

LOCATION IN PANEL	SUBSIDENCE STATION	STATION PLUS	AVERAGE SINCE 03-05-90
*****	*****	*****	*****
	1	-399.88	0.02
	2	-376.10	0.02
	3	-352.31	0.02
	4	-327.81	0.02
	5	-302.74	0.03
	6	-277.67	0.02
	7	-252.91	0.00
	8	-228.06	0.02
	9	-203.22	0.00
	10	-178.02	-0.01
	11	-152.98	-0.01
	12	-128.17	-0.02
	13	-103.76	-0.04
	14	-79.23	-0.05
	15	-53.91	-0.08
	16	-29.53	-0.11
T. G.	17	-4.67	-0.13
	18	44.98	-0.37
	19	94.67	-0.86
	20	144.40	-1.71
	21	194.26	-2.70
	22	244.94	-3.20
CENTER	23	295.08	-3.33
	24	344.43	-3.28
	25	369.29	-3.19
	26	394.09	-2.95
	27	418.96	-2.67
	28	443.77	-2.21
	29	472.83	-1.64
	30	497.74	-1.12
	31	517.68	-0.81
	32	547.66	-0.47
	33	572.62	-0.33
H. G.	34	597.63	-0.24
	35	622.37	-0.18
	36	647.21	-0.13
	37	672.17	-0.11
	38	697.21	-0.09
	39	722.39	-0.03
	40	747.40	-0.06
	41	771.54	-0.05
	42	794.95	-0.06
	43	818.47	-0.06
	44	841.35	-0.05
	45	864.06	-0.03
	46	886.73	-0.04
	47	909.96	-0.02
	48	933.35	-0.03
	49	960.15	-0.03

TABLE 2

II. DIFFERENCE IN GROUND ELEVATIONS: First LW Panel

STATION	SURVEY DATE													AVERAGE	
	02-14-90	02-16-90	02-21-90	02-23-90	02-26-90	02-28-90	03-02-90	03-05-90	03-12-90	03-19-90	04-12-90	06-11-90	03-05-90	SINCE	SINCE
NUMBER	02-14-90	02-16-90	02-21-90	02-23-90	02-26-90	02-28-90	03-02-90	03-05-90	03-12-90	03-19-90	04-12-90	06-11-90	03-05-90	03-05-90	03-05-90
1	0.01	0.01	0.00	0.00	0.00	0.01	0.02	0.01	0.03	0.05	-0.01	0.00	0.08	0.02	
2	0.00	0.02	0.01	-0.02	0.00	0.01	0.01	0.02	0.02	0.05	0.01	0.07	0.10	0.02	
3	0.03	0.03	0.01	0.01	0.01	0.01	0.03	0.02	0.02	0.05	0.01	0.08	0.10	0.02	
4	0.02	0.02	0.02	0.01	0.01	0.01	0.02	0.01	0.03	0.05	0.01	0.04	0.10	0.02	
5	0.03	0.02	0.03	0.02	0.02	0.02	0.04	0.04	0.01	0.06	0.01	0.07	0.12	0.03	
6	0.02	0.01	0.01	0.01	0.04	0.01	0.03	0.02	0.02	0.05	0.01	0.07	0.10	0.02	
7	-0.03	-0.01	0.00	-0.02	-0.01	-0.00	0.01	0.00	0.00	0.03	-0.02	0.05	0.01	0.00	
8	0.01	0.01	0.02	0.00	0.01	0.01	0.02	0.01	0.02	0.04	0.00	0.06	0.07	0.02	
9	0.01	0.01	0.00	0.00	0.00	-0.00	0.01	-0.01	0.00	0.03	-0.01	-1.96	0.01	0.00	
10	0.01	0.01	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	0.02	-0.03	0.00	-0.03	-0.01	
11	0.08	0.01	0.00	-0.01	0.01	-0.01	-0.01	-0.01	-0.03	0.01	-0.02	0.03	-0.05	-0.01	
12	0.08	0.01	-0.01	-0.02	-0.02	-0.03	-0.03	-0.03	-0.03	0.00	-0.03	0.02	-0.09	-0.02	
13	-0.04	0.01	-0.01	-0.02	-0.02	-0.03	-0.03	-0.03	-0.04	-0.01	-0.06	0.00	-0.14	-0.04	
14	0.07	0.00	-0.01	-0.04	-0.03	-0.07	-0.05	-0.06	-0.06	-0.02	-0.07	-0.01	-0.21	-0.05	
15	0.08	-0.01	-0.02	-0.05	-0.07	-0.08	-0.08	-0.08	-0.08	-0.08	-0.13	-0.07	-0.43	-0.11	
16	0.07	0.00	-0.03	-0.08	-0.09	-0.10	-0.10	-0.11	-0.11	-0.08	-0.13	-0.07	-0.51	-0.13	
T.G. 17	0.11	0.05	0.01	-0.06	-0.09	-0.11	-0.12	-0.13	-0.13	-0.10	-0.15	-0.09	-0.51	-0.13	
18	0.03	0.01	-0.06	-0.21	-0.29	-0.34	-0.35	-0.36	-0.36	-0.34	-0.43	-0.36	-1.49	-0.37	
19	0.08	0.02	-0.07	-0.49	-0.68	-0.81	-0.83	-0.84	-0.85	-0.83	-0.90	-0.86	-3.42	-0.86	
20	0.09	0.00	-0.13	-1.13	-1.47	-1.65	-1.68	-1.69	-1.71	-1.69	-1.75	-1.73	-6.84	-1.71	
21	0.10	-0.01	-0.18	-1.97	-2.41	-2.60	-2.65	-2.68	-2.70	-2.67	-2.74	-2.71	-10.79	-2.70	
22	0.08	-0.01	-0.22	-2.43	-2.90	-3.09	-3.11	-3.17	-3.22	-3.18	-3.22	-3.21	-12.79	-3.20	
Center 23	0.11	0.01	-0.21	-2.54	-3.01	-3.23	-3.23	-3.31	-3.36	-3.30	-3.34	-3.34	-13.31	-3.33	
24	0.09	0.00	-0.21	-2.48	-2.96	-3.19	-3.20	-3.28	-3.30	-3.25	-3.30	-3.20	-12.74	-3.19	
25	0.08	-0.01	-0.20	-2.37	-2.85	-3.08	-3.09	-3.18	-3.21	-3.15	-3.20	-3.20	-12.74	-2.95	
26	0.09	-0.01	-0.17	-2.13	-2.62	-2.85	-2.87	-2.93	-2.97	-2.92	-2.98	-2.97	-11.80	-2.67	
27	0.06	-0.03	-0.18	-1.84	-2.32	-2.56	-2.57	-2.66	-2.70	-2.63	-2.68	-2.68	-10.67	-2.21	
28	0.07	-0.03	-0.15	-1.41	-1.88	-2.11	-2.13	-2.20	-2.24	-2.17	-2.22	-2.22	-8.83	-1.64	
29	0.08	0.00	-0.06	-0.71	-1.24	-1.52	-1.53	-1.65	-1.66	-1.60	-1.66	-1.64	-6.57	-1.12	
30	0.09	0.00	-0.04	-0.44	-0.79	-1.02	-1.03	-1.12	-1.15	-1.08	-1.14	-1.15	-4.49	-1.12	
31	0.07	-0.01	-0.05	-0.33	-0.55	-0.72	-0.73	-0.81	-0.84	-0.78	-0.83	-0.82	-3.26	-0.81	
32	0.09	0.00	-0.04	-0.21	-0.32	-0.40	-0.38	-0.47	-0.49	-0.42	-0.48	-0.46	-1.86	-0.47	
33	0.08	-0.02	-0.05	-0.16	-0.24	-0.28	-0.25	-0.33	-0.36	-0.28	-0.34	-0.31	-1.31	-0.33	
H.G. 34	0.08	-0.02	-0.03	-0.12	-0.18	-0.19	-0.16	-0.24	-0.30	-0.19	-0.25	-0.23	-0.98	-0.24	
35	0.08	-0.02	-0.02	-0.08	-0.13	-0.14	-0.11	-0.18	-0.21	-0.14	-0.19	-0.16	-0.72	-0.18	
36	0.09	0.00	0.01	-0.06	-0.09	-0.09	-0.06	-0.14	-0.16	-0.08	-0.13	-0.11	-0.51	-0.13	
37	0.07	-0.01	-0.01	-0.06	-0.09	-0.08	-0.05	-0.12	-0.15	-0.07	-0.12	-0.09	-0.46	-0.11	
38	0.06	-0.01	-0.03	-0.05	-0.07	-0.06	-0.03	-0.10	-0.11	-0.05	-0.10	-0.07	-0.36	-0.09	
39	0.10	0.03	0.05	-0.01	-0.02	0.00	0.03	-0.04	-0.06	0.01	-0.04	-0.01	-0.13	-0.03	
40	0.08	0.01	0.03	-0.02	-0.06	-0.03	0.00	-0.07	-0.08	-0.02	-0.07	-0.07	-0.24	-0.06	
41	0.09	0.00	0.01	-0.03	-0.05	-0.03	0.01	-0.07	-0.08	-0.01	-0.06	-0.06	-0.22	-0.05	
42	0.10	0.00	0.01	-0.01	-0.03	-0.02	0.01	-0.07	-0.09	-0.01	-0.06	-0.03	-0.23	-0.06	
43	0.06	0.00	0.03	-0.02	-0.04	-0.01	0.02	-0.08	-0.08	0.01	-0.04	-0.01	-0.19	-0.05	
44	0.08	-0.01	0.03	-0.02	-0.03	-0.01	0.02	-0.08	-0.08	0.02	-0.03	-0.03	-0.10	-0.03	
45	0.07	-0.01	0.03	-0.01	-0.01	-0.00	0.04	-0.04	-0.07	0.00	-0.05	-0.01	-0.17	-0.04	
46	0.07	-0.01	0.02	-0.01	-0.05	-0.01	0.02	-0.05	-0.07	0.02	-0.03	0.01	-0.10	-0.02	
47	0.05	0.01	0.05	-0.01	-0.02	0.00	0.03	-0.03	-0.06	0.02	-0.03	0.01	-0.12	-0.03	
48	0.07	-0.01	0.00	0.00	-0.02	-0.00	0.02	-0.04	-0.06	0.01	-0.03	0.01	-0.12	-0.03	
49	0.06	-0.02	0.03	0.00	-0.05	0.00	-2.97	-0.03	-0.07	0.01	-0.03	0.01	-0.12	-0.03	

Distance LW face is from road (in feet):

-430

-248

+38

+253

+340

+516

+678

+809

- sign means West of road + sign means East of road

- K. (5) (b) describe the anticipated effects of planned subsidence upon the land and water resources identified in the subsidence control survey and survey of ground and surface water resources.

See Addendum to Page 33, Part 3, K(5)(b)
and Attachment 31

- (c) describe the measures to be taken to mitigate the anticipated effects of planned subsidence to the land and water resources.

See Addendum to Page 33, Part 3, K(5)(c)

- (d) describe the anticipated effects of planned subsidence upon the structures identified in the subsidence control survey.

See Addendum to Page 33, Part 3, K(5)(d)

- (e) describe the proposed measures to be taken to mitigate anticipated effects to structures.

See Addendum to Page 33, Part 3, K(5)(e)

- (f) describe the proposed measures to determine the extent of mining related damages including a presubsidence survey with an indication of the timing of the survey.

See Addendum to Page 33, Part 3, K(5)(f)

- (g) describe provisions for repair and/or compensation for damages to structures.

See Addendum to Page 33, Part 3, K(5)(g)

ADDENDUM TO PAGE 32 AND 33, PART 3, K(5)(a-g)
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
PERMIT D-0360

ANTICIPATED EFFECTS OF PLANNED SUBSIDENCE

General

The anticipated surface effects of subsidence during and following coal extraction by the longwall method at the Powhatan No. 6 Mine are related to the following movements of the ground surface:

1. Vertical subsidence
2. Horizontal movement

The combination of vertical and horizontal movements of points on the ground surface leads to tensile or extension and compression strains from curvature of the ground surface and tilt. Extension and compression of the ground surface, in the direction of the movement of the longwall face, occur as the face moves in the direction of mining. The extension and compression effects develop after passage of the longwall face. The surface curvature, with resulting extension and compression, and the tilt near the ends of a mined panel and along the sides of a mined panel, represent the permanent effects of subsidence.

Background [Response to Page 32, K(5)(a)]

The dip of the coal is 19 ft per mile at South 63 Degrees East. The strike is North 27 Degrees East. The panel dimensions are approximately 600 to 800 ft wide and 7,000 ft long. The gates are approximately 200 ft wide between panels. The coal thickness to be extracted is approximately 48 to 60 inches. There is approximately 14 to 43 percent of the overburden classified as hard rock according to the test hole data.

Time of Subsidence

The surface effects of mining occur at times generally related to the advance of the longwall face.

1. Movements which develop over a panel being mined with passage of the face: these represent the most significant movements and are generally complete within three (3) months of passage of the face.
2. Movements which occur over a previously mined panel as an adjacent panel is mined: such superincumbent movements

are relatively small compared to the movements above the panel that is being mined.

3. Movements over a long period of time due to consolidation of the gob and time dependent stress readjustment: long-term subsidence of the ground surface is not expected to be significant.

Predicted Movements [Response to Page 32, K(5)(a)]

The surface movements indicated below are derived from measurements made during subsidence over OVCC's first longwall panel. Similar movements are anticipated within the application area.

The maximum subsidence occurred near the center of the panel being mined and was measured at 60 to 65 percent of the extracted seam thickness or 3 to 3½ ft. The angle of draw was measured to be approximately 30 degrees. Some horizontal movement occurred in steeply sloping ground where several slips occurred. These slips were mainly in slip-prone soils. Near the center of the panel, the ground moved upwards in several small areas after subsidence as the compressive strain caused the soils to heave upward. Surface cracking up to about six inches wide occurred during the time the areas were put under tension.

Effect on Surface Facilities

1. [Response to Page 33, K(5)(b)]
Tension cracking of the ground surface may occur at the sides and ends of a longwall panel. These cracks in the surface may vary in width from hairline, up to 1-1/2 inches wide. In some instances, cracks have been observed to be 6 in. to over 1 ft wide.
2. [Response to Page 33, K(5)(d)]
Structures situated over a panel may be damaged due to subsidence. The damage to be expected may involve cracking of plaster, cracking between concrete block or brick. Cracks in these structures may close after subsidence is complete. The magnitude of this damage is directly related to the extraction rate. If the rate is slow, more severe damage (such as concrete cracking, differential settlement of corners, etc.) will occur. In some cases, it has been observed that one end of a structure will be in tension while other parts are stationary as the subsidence wave moves through the structure. In fact, all structures experience a series of tension/compression strains that causes some damage.

ADDENDUM TO PAGE 32 AND 33, PAGE 3, K(5)(a-g)
PAGE THREE

3. [Response to Page 33, K(5)(d)]
Underground utility lines (water and gas) may be broken by tensile strains.
4. [Response to Page 33, K(5)(b)]
Surface slumping may occur due to subsidence where relatively steep slopes with landslide prone soils exist.
5. [Response to Page 33, K(5)(b)]
Ponds or streams may become partially dry temporarily as a result of subsidence-induced surface cracks.

Remedial Measures

1. [Response to Page 33, K(5)(d)]
In the event that roadway surfaces are damaged by cracks resulting from subsidence due to mining, OVCC, at the request of the applicable regulatory authority, will repair the surface to pre-mining conditions.
2. [Response to Page 33, K(5)(f)]
OVCC will mail written notice to owners and occupants of surface property or structures of OVCC intent to mine under such property or structures at least six months prior to any mining by OVCC under their property. Notwithstanding its mining rights and without waiving nor releasing any of its rights, OVCC will offer to repair or compensate for damages to all structures and facilities caused by OVCC's mining operations. A pre-subsidence survey of all structures to be undermined will be conducted by OVCC personnel and will be used to determine the condition of the structures and facilities prior to the mining. This survey may include, but not be limited to: still and video photography, land surveying, making various measurements, interviewing landowners, tenants, or other individuals, and making various drawings. Refusal of the landowner to allow a pre-subsidence survey will release OVCC from the requirement to conduct the survey. This survey will be performed in accordance with Underground PPD 90-3.
3. [Response to Page 33, K(5)(c)]
Notwithstanding its mining rights and without waiving nor releasing any of its rights, OVCC will make repairs of damage caused to surface lands by OVCC's mining operations if the damage reduces the foreseeable use or value of the surface lands. If such damage occurs, OVCC

will submit to the Chief within thirty days after the damage occurs:

- a. Site specific plans for the repair or mitigation of the damage, including a time schedule for performance of the remedial action.
 - b. A request for more time to prepare such plans; or
 - c. Written notification that OVCC believes that repair or restoration measures are not technologically feasible. If repair or restoration measures are not desired by the owner of a structure or if repair or restoration measures are not technologically feasible, other mitigatory measures will be described.
4. [Response to Page 33, K(5) (e)]
Utility companies, which own transmission lines, pipe lines, or other sensitive structures in the permit area, will be notified at least six (6) months prior to any mining under such structures by OVCC. OVCC, subject to its mining rights, will offer to repair such structures.
5. [Response to Page 33, K(5) (c)]
Damage to surface land will be repaired by local contractors. As surface damage occurs, the landowner will be notified and permission to repair the damage will be requested. Surface cracks will usually be repaired by the following method: After the length of the subsidence crack has been determined, a bulldozer will be used to cut a V-shaped trench. The depth of this trench will be approximately 8-10 feet or down to bedrock. During the excavation topsoil will be segregated from subsoil and rock. Upon completion of the excavation, the material will be compacted using the track of the bulldozer. Once the soil material has been replaced, the area will be reclaimed to ODNR specifications.

OVCC will employ a program to monitor surface cracking and settling resulting from subsidence. Areas being mined will be inspected at various intervals, ranging from daily to weekly. These areas will be visually inspected for any subsidence related problems. If a problem is found, the landowner will be notified immediately.

In most cases, surface cracks are expected to open and close relatively rapidly, however, some surface cracks may take weeks to close. For this reason, most cracks

will not be repaired until OVCC determines that the cracks are not going to close themselves. If the surface cracks are in an area that is commonly traveled by man or livestock, the cracks will be repaired immediately. Surface cracking that is found in areas not commonly traveled, may be marked by brightly colored tape. This tape alerts anyone in the area of the depression or opening. If the cracks do not close within the period of time OVCC determines is adequate, a contractor will repair the cracks.

Monitoring of these areas will continue for up to six months after mining, and if the cracks reopen, they will once again be repaired. Monitoring of panel areas before mining consists of visual inspection or aerial photo review. These areas are being inspected before mining, due to the water monitoring program which starts one year prior to mining.

OVCC's subsidence program will adequately assure that the value and reasonably foreseeable use of the surface land is maintained.

6. [Response to Page 33, K(5)(e)]
The Otto and Campbell dairy farms are located directly over a longwall panel. The dairy barns and milk houses will experience subsidence. Some surface and structural damage is anticipated. It is the intention of OVCC to remove the coal under all structures, including the dairy barns and milk houses on the Otto and Campbell dairy farms as rapidly as possible to minimize damage.

Prior to undermining the dairy structures, most particularly, the barn/milk houses, OVCC will prepare the structure at OVCC's expense as follows:

- a. A water supply line from the County water line will be installed prior to mining in order to provide water on a continuous basis. This water line will be installed in such a manner that subsidence will not interrupt the flow of water.
- b. The electrical supply to the barn/milk houses will be inspected and, if necessary, changed to permit the downward movement of the structure.
- c. The framework structure of the barns will be inspected to determine its ability to withstand the forces caused by subsidence. Weak members will be

reinforced (with materials of similar construction if practical). Temporary reinforcement measures will be used where practical in order to return the barn to pre-mining conditions after mining is complete.

- d. The milking system will be inspected to determine its ability to withstand the forces caused by subsidence. Rigidly held lines will be fastened with flexible couplings to permit movement of the barn and still permit the normal flow of milk to the bulk tank. All modifications will comply with State and County Health Department guidelines.
- e. The bulk milk tanks will be placed on a low-profile platform that permits easy, ongoing leveling. The tank will be re-certified after this change is made at the expense of OVCC. The platform will be arranged to maintain adequate clearance over the tank.
- f. The compressors and coolant lines for the bulk tank will be inspected and retrofitted with flexible connections to permit the downward movement of the structure.

During mining under the barn/milk houses, OVCC will provide the following services at OVCC's expense:

- a. The barn/milk houses will be inspected at least 2 hours prior to milking for damage that may impede normal milking operations. Minor repairs will be made to insure that the milking processes will occur normally. Specifically, the barn and related facilities (e.g., stanchions) will be maintained in a usable condition. Milk lines will be inspected for breakage and flow direction and any repairs will be made prior to milking. Compressors and refrigerant lines will be inspected and repairs will be made if necessary. The bulk tank will be re-leveled and re-certified prior to pick-up of the milk at OVCC's expense. The integrity of both the water and the electrical systems will be inspected and repaired prior to milking. Sufficient numbers of personnel qualified to do the inspection and repair work will be present before the milking begins. During milking, any necessary repairs will be made to allow the milking process to continue.

- b. Following the milking, any additional repairs to the facilities not needed for milking will be completed. The requirements of the County and State Health Service Departments for a Grade A dairy farm will be maintained during subsidence at OVCC's expense, including the repair of doors, the barn floor, the barn cleaner, and the water system. If the barn cleaners cannot be maintained in operation, manual labor will be used to keep the barn clean.
- c. [Response to Page 33, K(5)(c)]
Prior to the introduction of farm equipment into fields that have been undermined, OVCC will inspect the field for cracks or slips. Repairs needed (to maintain access into the fields) will be made at appropriate times. Crop lands damaged by

subsidence will be repaired at appropriate times to permit harvest or cultivation without damage to personnel or equipment. Lost or damaged crops will be replaced in kind by OVCC at OVCC's expense. Note: "appropriate times" indicates that the repairs will be made 1) at a time when access is needed and 2) when damage to adjacent plants will be minimized. In any case, crop production will be maintained during and after mining.
- d. [Response to Page 32, K(5)(b)]
OVCC believes that there will be no effect on the crop production as a result of mining. This fact is supported by a paper written by Dr. Frank L. Himes, Ph.D., entitled "Agronomic Evaluation of the Land in the Southern Ohio Coal Company Area", June, 1983. A copy is included in this addendum.
- 7. [Response to Page 33, K(5)(g)]
After mining, all structures will be repaired or replaced as required or the owner will be compensated for the reduction in value. OVCC will make use of identical materials to make repairs. All structures to be repaired will be returned to their pre-mining condition in all ways, including color, construction, and composition. Structures damaged beyond repair will be replaced with identical construction, or the owner will be compensated for the reduction in value.

ADDENDUM TO PAGE 32 AND 33, PART 3, K(5) (a-g)

8. [Response to Page 33, K(5) (c)]
Affected water supplies will be subject to the provisions found in the Addendum to Page 19, Part 2, F. In the long term, permanent water supplies will consist of re-drilled wells, re-developed springs, new or repaired cisterns, re-dug ponds, or with county water. If county water is used, a single, lump sum cash amount will be deposited in the Owner's bank. The sum shall be sufficient to provide enough interest to pay for the cost of county water. The lump sum will belong to the Owner when deposited in the bank. A combination of these provisions may be required. It is the intent of OVCC to offer landowners equitable options as outlined above in order to restore the reasonable foreseeable use of the land and facilities.

AGRONOMIC EVALUATION OF LAND
IN THE
SOUTHERN OHIO COAL COMPANY AREA

AMERICAN ELECTRIC POWER
SERVICE CORPORATION

JUNE, 1983

FRANK L. HIMES, Ph.D.
Professor of Agronomy
Ohio State University

INTRODUCTION

Areas considered typical of different surface effects of the Meigs County Mine #2 were observed on May 26, 1983. Mr. Keith Peluchette assisted me in reading the detailed mining map in respect to surface locations and data of mining. The dates of mining varied from three (3) years to present.

OBSERVATIONS

The areas of observation made by walking, included a small corn field (fallow this year) and the adjacent woods, an orchard, and a meadow area near a road. Additional areas were observed by driving around the area.

1. Subsidence with associated cracking did not result in mixing of soil layers except possibly for some sloughing at the cracks.
2. The trees in the subsided areas did not show damage when compared to those in the areas that had not been subsided.
3. After the cracks close in the later stages of subsidence, they are difficult to locate in densely vegetated meadows and woods.

DISCUSSION

1. No evidence was obtained that the subsidence would alter soil management practices. Since the soil horizons (topsoil, subsoil, and parent material) have the same respective locations, the chemical properties of the soil have not been changed. Therefore, fertilizer and liming recommendations would not change with subsidence. After any cracks have closed, the same equipment could be used on both the subsided and the non-subsided areas. The surface slopes were not altered appreciably in respect to equipment use.
2. Although no sloughing was observed on the cracks, common sense would indicate that plant residues and a little topsoil would enter any such cracks. The extent of sloughing would depend upon the surface conditions and activities. The coating of the surface of the cracks with the surface "debris" would produce a plane of weakness. By this is meant, during very dry periods when the soil contracts, shrinkage cracks would be along these faces. Also, plant roots would grow more extensively in the remnant of the crack than in the adjacent zone because the fertility and aeration are better. Plant roots

are not drill bits and penetrate the soil only by entering pores (or voids) that are larger than the root.

As indicated on the map included, the Monongahela soils (and likewise for the Latham soils) have a compact layer at 20 to 30 inches that impedes root penetration and percolation of water. The fracturing of this layer and partial filling with debris would increase the rooting depth of and available water to the plants growing within a few inches of the crack. In some areas of Ohio, farmers subsoil their land which is a practice to fracture the dense layers 15 to 24 inches below the surface. The practice called vertical mulching is more effective because plant residues are incorporated. It improves both root penetration and the infiltration and percolation of water. In most instances, the additional infiltration results in less runoff and less erosion.

Erosion is a natural hazard for the Gilpin, Dekalb, Latham, Monongahela, and Upshur soils. These soils usually occur on slopes exceeding six (6) percent. Therefore, practices or occurrences that decrease the amount of water runoff will decrease erosion. Because these soils are rated highly erosive (see map

and Table 1), farming practices should be selected for erosion control to hold erosion to a minimum. Although no waterways were observed, if subsidence caused a shift in a waterway, the farmer would need to make minor changes in his tillage practices.

3. Tables 2, 3, and 4 summarize other properties of the soils and the type of agriculture in Meigs County. The productivity of these soils is often limited by fairly acid subsoils, low fertility, shallow (less than 36 inches) rooting, low moisture holding capacity, and steep slopes. The soil management practices needed to make these soils productive do not change with subsidence. Although a detailed soil survey of the area is not available, a generalized map and publications containing additional information about these soils are included.

CONCLUSION

The fertility of the soils was not altered by subsidence except within cracks if sloughing occurred. The fracturing of layers that restrict water movement and root penetration should be beneficial to the plants growing near the fractures. The maintenance of the farmer's erosion control waterways may have to be adjusted accordingly if subsidence were to change the flow in them.

The soils in this area are difficult to maintain on a high state of productivity, and subsidence has little impact on the chemical and physical properties of the soils. Based on practices in other areas of the world, the fracturing of the layers inhibiting root development will be beneficial to plant growth. The agronomic uses of the soils are not influenced by longwalling.

TABLE 1¹

Soil Series	K*
Dekalb	0.24
Gilpin	0.32
Latham	0.43
Monongahela	0.43
Upshur	0.43

*K is the soil erodibility factor. The highest value for Ohio soils is 0.49 and most are below 0.40.

¹"Ohio Erosion Control and Sediment Pollution Abatement Guide." Bulletin 594, Cooperative Extension Service, The Ohio State University.

TABLE 2

Meigs County - Soil and Water Conservation Needs - 1967

Total Land Area	277,610 A
Non-Inventory Acreage (Urban, etc.)	13,058 A
Inventory Acreage	264,552 A
Cropland ²	48,263 A
Pasture ²	41,251 A
Forest ²	168,100 A
Other Land ²	6,938 A

IRRIGATED AND NON-IRRIGATED CROPLAND
BY LAND CAPABILITY CLASSES, 1967³

LAND CAPABILITY CLASS SUB-CLASS	ALL ROW CROPS	FIELD CROPS CLOSE GROWN	TILLAGE ROTATION		CONSER- VATION USE ONLY	TEMPORAR- ILY IDLE CROPLAND	ORCHARDS VINEYARDS AND BUSH FRUITS	TOTAL CROPLAND
			ROTATION HAY AND PASTURE	HAY- LAND				
1	867	434	2842	908	864	1246	0	7161
2E	1127	217	1516	909	2013	1091	0	6873
3E	1084	651	1326	2181	2589	623	160	8614
4E	2212	217	2463	2181	576	1246	0	8895
6E	1864	217	2652	3635	575	312	0	9255
2W	867	1301	1894	182	290	779	0	5313
3W	434	217	757	0	0	0	0	1408
7S	0	0	380	364	0	0	0	744
TOTAL	8455	3254	13830	10360	6907	5297	160	48263

PASTURE, FOREST, AND OTHER LAND ACRES
BY LAND CAPABILITY CLASSES, 1967⁴

LAND CAPABILITY CLASS SUB-CLASS	<u>PASTURE & RANGE</u>		<u>FOREST</u>				TOTAL LAND IN INVENTORY
	PASTURE	COMMER- CIAL	NON- COMMER- CIAL	COMMER- CIAL GRAZED	IN FARMS	NOT IN FARMS	
1	2633	5433	0	217	867	0	16094
2E	1229	1654	0	0	651	0	10407
3E	4740	5433	0	867	867	0	19654
4E	8601	25042	200	7156	217	0	42955
6E	13692	49612	0	9541	867	0	73426
7E	4213	11341	0	1735	217	0	15771
2W	1404	1181	0	217	0	0	7898
3W	351	945	0	0	0	0	2704
6S	175	277	0	0	0	0	412
7S	4213	66622	200	9107	1084	1301	74164
8S	0	0	200	0	0	867	1067
TOTAL	41251	167500	600	28840	4770	2168	264552

Ohio Soil and Water Conservation Needs Inventory, Sponsored
by USDA, 1971.

1. Page 12
2. Page 14
3. Page 29
4. Page 48

TABLE 3

MEIGS COUNTY - AGRICULTURAL STATISTICS

	<u>1980</u>	<u>1981</u>
Number of Farms ¹	620	610
Average Size of Farm ¹	177 A	182 A
Land in Farms ¹	110,000 A	111,000 A
Corn for Grain ²	3,700 A	5,200 A
Yield ²	130 bu./A	85 bu./A
Soybeans ³	(Less than 1,000 A)	
Wheat ⁴	(Less than 1,000 A)	
Oats ⁵	(Less than 1,000 A)	
Hay (all) ⁶	16,800 A	15,800 A
Yield ⁶	2.2 T/A	2.2 T/A
All Cattle and Milk Cows ⁷	13,000	14,000
Hogs and Pigs ⁸	2,000	1,900
Stock Sheep ⁸	(Less than 1,000)	
Hens and Pullets, Laying Age ⁸	30,000	30,000

Published by Ohio Co-op Reporting Service, June 1981-1982,
Ohio Agricultural Statistics.

1. Page 7
2. Page 9
3. Page 11

4. Page 13
5. Page 15
6. Page 17

7. Page 37
8. Page 43

TABLE 4

Available Moisture Capacity for the Surface Layer¹

Dekalb Soil	0.13-0.17 in./in. of soil
Gilpin Soil	0.17-0.22 in./in. of soil
Latham Soil	0.18-0.22 in./in. of soil
Upshur Soil	0.18-0.22 in./in. of soil

¹Soil Survey of Monroe County, Ohio. Published by USDA, 1974, pp. 39-43.

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M.Sc. Purdue University (Organic Chemistry), 1951.
Massachusetts Institute of Technology (Westinghouse Science Teacher Institute), Summer 1952.
Ph.D. Purdue University (Soil Fertility and Chemistry), 1956.

Professional and Technical Societies:

American Society of Agronomy, Soil Science Society of America, International Soil Science Society, American Chemical Society, Sigma Xi, Gamma Sigma Delta.

Professional Experience:

1949-1951	Teaching Assistant, Department of Chemistry, Purdue University.
1951-1953	High School Science Teacher, Remington High School, Remington, Indiana.
1953-1955	Fellowship, Department of Agronomy, Purdue University.
1955-1957	Assistant Professor in the Departments of Agriculture and Chemistry, Middle Tennessee State University, Murfreesboro, Tennessee.
1957-present	Assistant Professor, Associate Professor, Professor, Department of Agronomy, Ohio State University.

Publications:

Books written

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ADDENDUM TO PAGE 33, PART 3, K(5)(c)
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
PERMIT D-0360

SLIP-PRONE SOILS

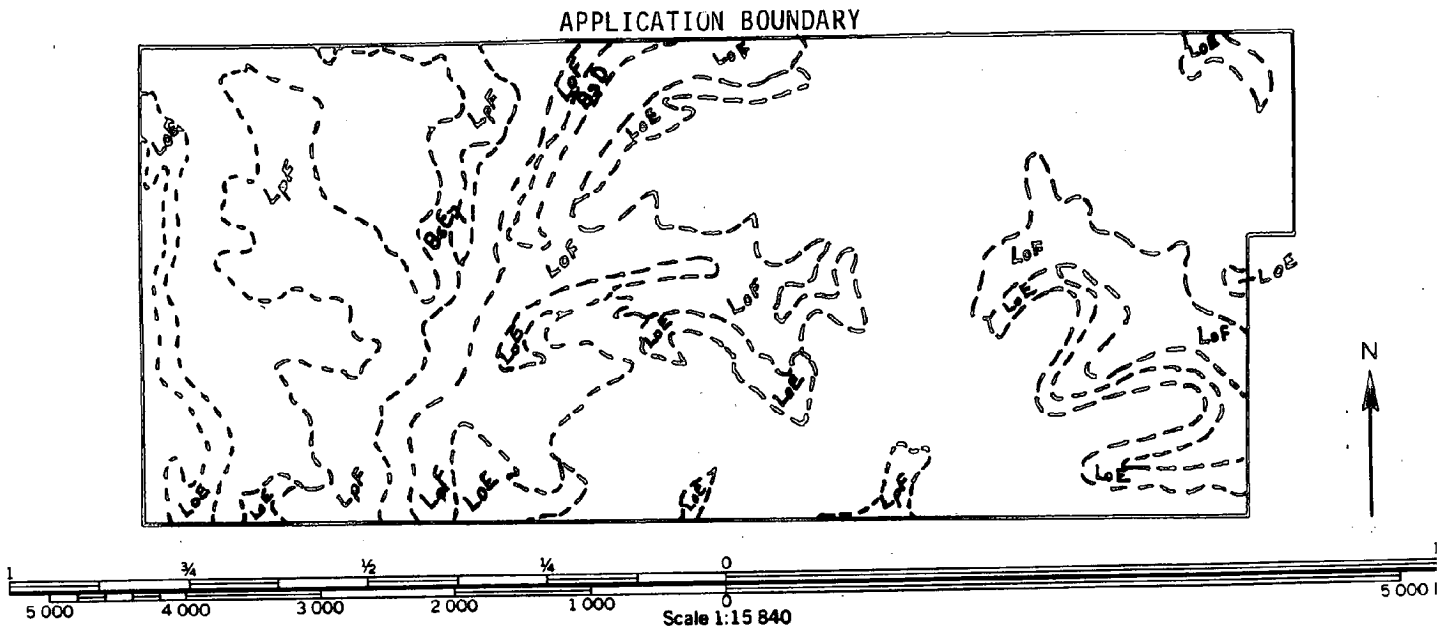
During our pre-subsidence survey, if potential slip-prone areas are discovered that would significantly affect the dwelling or useable land areas, these will be recorded. If subsidence due to mining operations causes material damage or reduces the value or reasonably foreseeable use of the surface land, OVCC will restore the land to a condition capable of supporting uses it was capable of supporting before subsidence. If slips are triggered by mining activities, these areas would be stabilized in accordance with accepted site specific procedures for such work if technologically and economically feasible. If not feasible, OVCC will arrange alternative mitigatory measures.

A search of the Belmont County Soils Maps (specifically Maps No. 52, 53, 60, and 61)* revealed approximately 16 potential slide/slip areas within the following soil types:

<u>Type</u>	<u>Slope</u>	<u>No. of Potential Slide/Slip Areas</u>
Lowell-Westmoreland Loams (LoE)	25%-40%	10
Lowell-Westmoreland Silt Loam (LoF)	40%-70%	2
Lowell-Westmoreland Silt Loam, Benched (LpF)	30%-70%	2
Brookside Silty Clay Loam (BsD, BSE)	15%-40%	2

During the pre-subsidence survey, these areas, as well as other similar sites that may have a significant impact to existing structures, will be reviewed. Should conditions dictate, site specific measures, not limited to but including installation of cut-off trenches, drainage systems, and retaining walls, may be taken to minimize adverse affects.

*Soil Survey of Belmont County
ODNR, USDA March, 1974



- LoE - LOWELL-WESTMORELAND SILT LOAM
25%-40% SLOPES
- LoF - LOWELL-WESTMORELAND SILT LOAM
40%-70% SLOPES
- LpF - LOWELL-WESTMORELAND SILT LOAM, BENCHED
30%-70% SLOPES
- BsD - BROOKSIDE SILTY CLAY LOAM
15%-25% SLOPES
- BsE - BROOKSIDE SILTY CLAY LOAM
25%-40% SLOPES

REPRODUCED FROM SOIL SURVEY
 OF BELMONT COUNTY, ODNr, USDA
 MARCH, 1974; MAPS 52, 53, 60, 61

